This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Nav 1358.94

Harvard College Library

FROM THE

UNITED STATES GOVERNMENT

THROUGH

The Hydrographic Office.

14 July, 1894.

U.S. — Bureau of navig. — Hydrog. office.
Pub.

No. 88.

DEPARTMENT OF THE NAVY
BUREAU OF NAVIGATION

U. S. HYDROGRAPHIC OFFICE.

EAST COAST OF SOUTH AMERICA,

FROM THE

ORINOCO RIVER TO CAPE VIRGINS,

INCLUDING

FALKLAND, SOUTH GEORGIA, SANDWICH, AND SOUTH SHETLAND ISLANDS.

SECOND EDITION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1894.

~~VIII. 8/1~~
[illegible]

[illegible] LIBRARY.

Mrs [illegible]

CONTENTS.

Page.
Preface v
Note vi
Index 445
Index chart vii
List of Hydrographic Office agents 490
List of Hydrographic Office publications 485

CHAPTER I.

Coast of Guiana, British, Dutch, and French. Orinoco River to Cape Orange. 1

CHAPTER II.

Coast of Brazil, General Remarks on winds and weather—Currents—Routes.. 52

CHAPTER III.

Coast of Brazil from Cape Orange to Pará River, and the Amazon River...... 64

CHAPTER IV.

Coast of Brazil from the Pará River to Cape Calcanhar........ 99

CHAPTER V.

Coast of Brazil—Offlying islands and rocks 133

CHAPTER VI.

Coast of Brazil—Cape Calcanhar to Bahia........ 138

CHAPTER VII.

Coast of Brazil—Bahia to Rio de Janeiro........ 176

CHAPTER VIII.

Coast of Brazil—Rio de Janeiro to Cape Castillo at the entrance to the Rio de la Plata 227

CHAPTER IX.

Coast of Uruguay—Rio de la Plata, north coast; Cape Castillo to Colonia... 270

CHAPTER X.

Coast of Argentine Republic—Rio de la Plata; south coast. Uruguay and Parana rivers........ 294

Page.

CHAPTER XI.

Coast of Argentine Republic—Cape San Antonio to Rio Negro 332

CHAPTER XII.

Coast of Patagonia—Rio Negro to Cape Virgins 353

CHAPTER XIII.

Falkland Islands, General Remarks—East Falkland 389

CHAPTER XIV.

Falkland Islands—Falkland Sound—West Falkland 415

CHAPTER XV.

Shag Rocks; South Georgia, Sandwich, South Orkney, and South Shetland Islands, and Graham Land 435

PREFACE.

The first edition of this work was compiled by Lieut. J. C. Fremont, U. S. Navy, and R. H. Orr, U. S. Hydrographic Office.

The second edition has been compiled chiefly from the above by R. C. Ray, U. S. Navy, who has also extended the description of the coast to the Orinoco river.

In the preparation of this edition the following sources of information were consulted:

Archives of U. S. Hydrographic Office.

Caribbean Sea and Gulf of Mexico, Vol. II, second edition, 1890, Hydrographic Office Publication No. 64.

West India Pilot, Part I, fifth edition, 1893, British Admiralty.

South America Pilot, Part I, fourth edition 1893, British Admiralty.

Hydrographic Office, British Admiralty and Brazilian charts.

Reports from U. S. consuls made to the Hydrographic Office especially for this publication.

The remarks on weather and routes, Chapter II, have been revised by Lieut. W. H. Beehler, U. S. Navy.

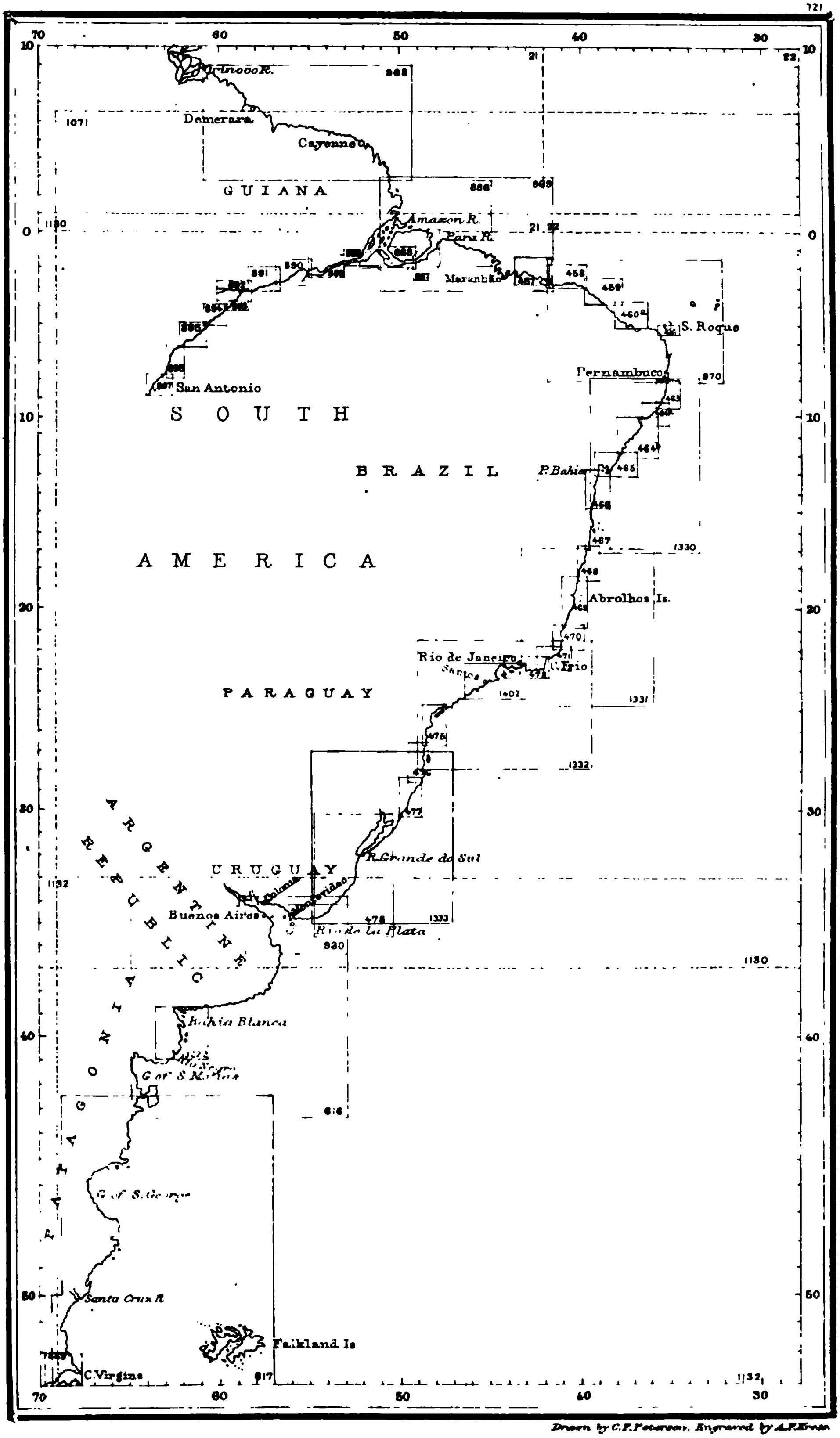
Late reports from officers cruising in United States vessels of war.

C. D. SIGSBEE,
Commander, U. S. Navy, Hydrographer.

U. S. HYDROGRAPHIC OFFICE,
Washington, D. C., March 23, 1894.

NOTE.

The bearings, courses, and trend of the land are true; but, for convenience, the corresponding magnetic bearings, to the nearest degree, follow in brackets. (Variation in 1894.) The directions of the winds are given for the points from which they blow; the directions of the currents for the points toward which they set. Distances are expressed in nautical miles; soundings, unless otherwise stated, are reduced to mean low water.



Drawn by C.F. Petersen. Engraved by A.F. Evans.

H. O. HARBOR AND SPECIAL CHARTS INCLUDED WITHIN LIMITS OF THIS WORK.

GUIANA.

No. 968. Orinoco River to Maraca Island.
1155. Mouths of the Demerara and Essequibo rivers and approaches.
1168. Georgetown and mouths of Demerara and Essequibo rivers. British Guiana.
1271. Surinam River. Dutch Guiana.
1238. Maroni and Mana rivers.
1298. Salut Islands.

AMAZON RIVER—BRAZIL.

887. Mouth of Pará River (eastern branch of Amazon); Sheet I. Pará to Santa Cruz Island; plan of Goiabal Shoals.
1375. Channel to Pará. Pará River.
888. Santa Cruz Island to Vieira Branch; Sheet II.
889. Vieira Branch to Maracas Island; Sheet III.
890. Maracas Island to Villa Bella; Sheet IV. Plan of anchorage off Santa Anna.
891. Villa Bella to Serpa; Sheet V.
892. Serpa to Manaos; Sheet VI.

MADEIRA RIVER—BRAZIL.

893. Mouth of the Madeira to Trocaná Island; Sheet I.
894. Trocaná Island to Mataura Island; Sheet II. Plan of rocks off Orua Island.
895. Mataura Island to Tapurú Island; Sheet III.
896. Tapurú Island to Veados Island; Sheet IV.
897. Veados Island to San Antonio; Sheet V. With plans of San Antonio and approaches; rocks off Abelhas.

BRAZIL.

969. Maraca Island to Paranahiba River.
886. Maraca Island to San João Island.
1364. The approaches to Maranhão.
457. Sta. Anna Island to Barra Velha d'Ignaruçu.
970. Paranahiba River to Pernambuco.
480. Tutoia Bar, western mouth of the Paranahiba River. Amaração Bar. (Barra Velha d'Iguaruçu), eastern mouth of the Paranahiba River.
458. Barra Velha d'Iguaruçu to Barra Aracati Açu.
459. Aracati Açu to Cape Iguapé.
1168. Ceara Bay.
460a. Cape Iguapé to Rio Mossoro.
537. Islands off the NE. coast of Brazil: Penedo de San Pédro, called also St. Paul rocks. The Rocas. Fernando Noronha.
481. St. Roque Reefs and Channel.
1313. Port Natal entrance to the Rio Grande do Norte.
1309. Port Cabadello (entrance to the Rio Parahiba do Norte).

No. 982. Pernambuco Road and Harbor. Plan of Port of Pernambuco.
1330. Pernambuco to Itacolomi Reef.
463. Pernambuco to Maceió.
483. Port Tamandare.
1276. Port Maceió.
464*a*. Maceió to San Francisco River.
464*b*. San Francisco River to Inhambupe River.
465. Rio Inhambupe to Morro São Paolo, including Bahia de Todos os Santos and approaches.
1325. Bahia de Todos os Santos.
975. Port of Bahia.
466. Bahia to Olivença.
484. Ilhéos Anchorage.
467. Olivença to Itacolomi Reef.
481. Cabral and Santa Cruz bays.
468. Itacolomi Reef to San Mateo. Enlarged plan of Abrolhos Islands Anchorage.
1331. Itacolomi Reef to Rio de Janeiro.
486. Abrolhos Islands Anchorage. Espiritu Santo Bay and Port Victoria.
469. San Mateo to Benevente.
470. Benevente to Cape St. Thomé.
485. Joacema Anchorage. Benevente Bay. Benevente to Itapemirim. Itabapuana Anchorage.
1332. Rio de Janeiro to Santa Catharina Island.
471. Cape of St. Thomé to Cape Frio.
1327. Macahé Anchorage.
487. Busios Anchorage. Cape Frio Port.
472. Cape Frio to Ilha Grande Bay.
1402. Rio de Janeiro to Santos.
971. Rio Janeiro Bay.
972. Rio Janeiro Harbor.
473. Sapetiba Bay to São Sebastião Island, including Ilha Grande Bay.
488. Ilha Grande and Sapetiba bays.
489. Picimguaba to Tamandua bays, including Batumirim, Ubatuba, Flamengos, Fortaleza and Marvirado bays.
490. Guarapari Bar. São Sebastião Anchorage. Castelhanos Bay, Sombrio Bay, east coast of São Sebastião Island. Itapacaroya Anchorage. Cambriu Anchorage. Port Bello Bay.
474. São Sebastião Island to Rio Iguapé and approaches to Santos.
491. Santos Bay and Harbor.
475. Rio Iguapé to Cape Itapacaroya.
1319. Paranagua Bay.
1333. Santa Catharina Island to Cape Santa Maria.
476. Cape Itapacaroya to Cape Sta. Marta.
477. Cape Sta. Marta to Tramandahy Bar. Plan of Torres Anchorage.
1191. Rio Grande do Sul.

URUGUAY AND ARGENTINE REPUBLIC.

Rio de la Plata and approaches.

616. Rio de la Plata to Nuevo Gulf; Sheet I.
930. Rio de la Plata and approaches. Plan of Lobos Island.
499. Maldonado Bay.
672. Montevideo and approaches; Flores Island to Punta del Cerro.
1215. Flores Island.

No. 503. Colonia Roads.
1328. Port la Plata.
1222. Bahia Blanca to Rio Negro.
1187. Bahia Blanca (Port Belgrano).
617. Nuevo Gulf to Magellan Strait with Falkland islands; Sheet II.
1369. Santa Cruz River.
443. Magellan Strait—Eastern entrance.

FALKLAND ISLANDS.

434. Berkeley Sound. Upper part of Berkeley Sound, including Port Louis, Stag Road, and Johnson Harbor.
435. Port Egmont, Keppel Sound, etc. Stanley Harbor, with Ports William and Harriet.
436. Port Fitzroy and Port Pleasant. Fox Bay. Port Albemarle. Port Stephens, with Anchor and Hoste inlets. Port Edgar.
433. Choiseul Sound. Bull Road.

SOUTH SHETLAND ISLANDS.

384. The South Shetland and South Orkney islands, with the tracks of the several discoveries from 1819 to 1843.

CHAPTER I.

COAST OF GUIANA—BRITISH, DUTCH, AND FRENCH—ORINOCO RIVER TO CAPE ORANGE.

Guiana.—The country comprehended under the general name of Guiana is subdivided into British, Dutch, and French Guiana. Its coast line, extending from the Orinoco river to the Oyapok river, is generally low; for the numerous rivers bring down vast quantities of alluvial matter, which accumulating on the shores, forms a border of low ground. The mud between high and low water marks is commonly covered with mangroves; at low water it appears like an inaccessible bank; but at high water it is inundated. Its southern limits are the Tumuc Humac and Acari ranges of mountains.

The only ports on this coast are the mouths of the rivers, which, for the most part, require knowledge and practical experience to cross the bars and shoals that in general encumber them; but as in this region no violent tempests ever occur, and there is not the smallest risk in anchoring in any convenient place, the necessity of forcing an entrance never can happen, as there will always be sufficient time to wait for a pilot, or to make the necessary examination by boats to conduct the vessel in safety.

Soundings.—It would appear that changes frequently take place in the depths of many parts of the coast of Guiana, particularly near the land. In 1817, between Connétable islets and the main, a depth of 8 fathoms was recorded, which in 1826 was reduced to 5 fathoms. In the same period the depth in the channel between the Salut isles and the shore is presumed to have changed from 8 to 4 fathoms. During the same interval, however, farther out, between the Maroni river and cape Orange, no alteration was observed. These supposed changes are rather in excess of what could fairly be ascribed to deposition from the rivers, and are no doubt partly due to original errors in sounding; but changes of a lesser degree occur periodically off the entrances of the streams of Guiana.

It is to be observed that off the entrances of all the large rivers of Guiana (excepting the Maroni), extending to a considerable distance from the land, the bottom is invariably of mud and shell, which is a good guide, for elsewhere it is of mud alone.

Tides.—The effect of the tidal streams is felt as far as 30 miles from the coast, where they merge into the general current setting to the NW.

The ebb stream, on leaving the rivers, expands and sets away from the land, whilst the flood converges to the mouths; there is, however, a movement of both streams to the westward, in conjunction with the current.

Current.—The direction of the principal current at some distance from the coast in nearly NW. by W., and its general velocity from 2 to 3 knots an hour, but the position where its strength slackens and the direction changes is extremely uncertain. A counter current may, however, be met with from July to November between latitude 8° and 10° N. on the meridian of 50° W., where its direction changes to north and NNE. Farther eastward the zone of this counter current increases in breadth, the velocity is greater, and its direction more easterly, as far as longitude 37° W. From thence it progressively expands, but decreases in strength, merging into the Guinea current in longitude 25° W. In the northern part of this eddy the direction of the stream inclines more to the northward, and the contrary on the southern limits. Profiting by these changes, and watching the reckoning closely, the voyage may be made to windward at the rate of 60 miles a day.

Rollers.—Heavy rollers are experienced on the coast of Guiana in the months of December, January, and February.

Mud banks.—The banks which are adjacent to the coast change their outline frequently, and are sometimes swept away to be reformed; this occurs principally at the mouths of the rivers. During the freshets of the rainy season the deposits are carried from the mouths of the rivers, thus deepening their channels.

They extend off shore from 5 to 12 miles, and have over them a depth of less than 5 fathoms; they are formed by the deposition of mud from the streams of the interior, which are highly charged with it.

If these banks remain long in one position they become indurated, and it requires the tidal influences of several years to remove them. When they are in this hardened state they are frequently discovered, by the sea breaking furiously over them into the mouths of the rivers, as if it were over a coral bottom; whereas over soft mud the water is generally smooth, and if of sufficient depth offers temporary anchorage.

The greatest changes appear to take place between Cayenne and cape Orange, correct records of which have been kept at the former place for a long period. Off Cayenne the hard mud bank, known as the Sommes, never extends beyond the line of Malingre and Pére islets, because outside that the tidal stream is in proximity with the edge of the current, which at this point approaches nearer the coast. The depths vary sometimes, however, between the Sommes and the Enfant Perdu; but the deposit there has not time to harden, and it never accumulates beyond a certain degree.

Trees.—During the rainy season the trees and grasses are torn away from the banks of the rivers and thrown out upon the shallow mud flats, where they take root with great rapidity and cause the mud to accumulate round them, so that the features, and even the direction, of the coast are frequently changed to a considerable distance. Northward of the city of Cayenne, in 1826, trees were growing where, in 1820, there was a depth of 15 and 16 feet water; and about twenty or thirty years previous to this they approached within 2 or 3 miles of the Enfant Perdu.

General directions.—Vessels bound to the coast of Guiana should endeavor to make the land southward of the port, but should not approach the Amazon river in order to avoid the prororoca hereafter described. Having made the land, run along it with the lead constantly going, keeping in from 7 to 10 fathoms water, to avoid the shoals bordering the coast; the latter depth is recommended in winter when the wind blows from about NE. or more directly toward the land. Although in these soundings land can not be seen in some parts, even in clear weather, it can be no inconvenience, for on nearing the point of destination the vessel may be hauled in until the land comes into view.

This may be done when it is desirable to recognize any particular part of the coast; but in such cases great attention must be paid to the lead. If a vessel nears her port at nightfall it will be better to anchor, and also in light winds when within the limits of the tidal streams, for the flood sets in toward the land. A vessel even when in 8 fathoms water will stir up the mud from the bottom, apparently as if her keel were plowing through it; a fact which might cause anxiety to anyone observing it for the first time.

Route to windward.—Vessels of light draft proceeding to wind ward from the Antilles, or having been set to leeward of their port in the season of the NE. breezes (December to end of March), will find it easy to work up between the land and the inner edge of the current, which is generally encountered in the depth of 6 fathoms. Those ot heavy draft will find it more to their advantage to cross the main stream, and work up in the zone of variable current.

From May to November this will be the best plan for all vessels to adopt, for at this period the SE. winds and inshore currents are at their greatest strength. The inshore passage in these months should only be made by vessels drawing less than 10 feet water.

Discolored water.—After passing to the southward of lat. 10° N. and between the meridians of 46° and 50° W. the water is often seen to change color from a light blue to dark green or dirty drab, with a current setting to the eastward at about one mile an hour. As the vessel proceeds to the SW. on about the parallel of 8° N. the usual light blue tinge will be resumed, and she will then have entered the general westerly stream; this light blue color will continue toward the shore, even within the boundary of deep soundings.

WINDS.—GUIANA AND NORTH COAST OF BRAZIL.

The year is divided into two seasons on the coast of Guiana; the comparatively cool one from November to May, when the NE. trade wind reaches the shore with some force; and the very hot season from June to November with SE. variable winds and calms.

The rains follow no exact law, but are prevalent always; the greater portion however falls in the early part of the year with the NE. trade.

In the northern hemisphere the trade winds increase in strength and change from ESE. to ENE. in the month of November, and extend progressively along the coasts of Guiana and Brazil, reaching as far as cape St. Roque. In the beginning of December they are generally quite steady at Cayenne, and in January and February they attain their greatest force.

In March these winds become weaker; at sunrise they blow from east and ENE., and sometimes in the afternoon and part of the night from NE.

About the beginning or middle of April the ESE. winds reach the coast of Brazil; they approach first cape St. Roque, then extend to the northward, and soon reach along the coast to the mouths of the Amazon. As soon as these winds have acquired sufficient strength they overcome those from ENE., which in May and June are to be found to the northward of the Amazon; and the latter, inclining more to east and ESE., become general along the whole coast of Guiana, and extending to about 250 miles off the land.

At the end of April and during the month of May, the change of season begins to take place; the variable winds extend and approach near the coast, calms and squalls are frequent, and sometimes it blows fresh from the SE.

In June the variable winds which extend from the equator to latitude 12° or 13° N., generally reach the coast of Guiana; squalls are still frequent, and the ENE. winds are rainy. With a continuance of ESE. winds fine weather sets in and the rain is carried to the West Indies.

In July squalls and calms are less frequent, and the direction of the wind is more from ESE. than ENE., and the weather is more frequently dry than wet.

In August, September, and October the winds on the coast of Guiana and Brazil are from ESE., and have acquired their full force; they blow almost uninterruptedly; and to the northward of cape St. Roque fine weather prevails. It has, however, happened that in some years the seasons have been entirely reversed.

Near the coast the wind generally decreases during the night; in the morning, the sooner it commences the stronger will be the trade during the day.

Land winds from SW. to NW. blow at intervals during all seasons close to the coast; they are less frequent in the beginning than in the fall of the year, and generally last but a short time.

Off the coast of Maranhão during January, February, and March, the rainy season, squalls from NW. to SW. are experienced, accompanied by thunder and lightning. In the months of April, May, and June, when the change of the season takes place, and also when the ENE. winds are followed by those from ESE. calms, squalls, and storms are frequent. The change of winds from ESE. to ENE., which takes place in November, is effected more suddenly; the atmosphere is more tranquil; the squalls, calms, and storms are less frequent.

The general direction of the wind is always two or three points more toward the south on the east part of the coast than on the west part; that is, when the wind is SE. at cape St. Roque it is ESE. at Maranhão, and when it is east at cape St. Roque, it is ENE. or NE. at Maranhão.

Climate.—The climate of British Guiana is hot and depressing, but not considered generally unhealthy. An epidemic of yellow fever occurred in 1881–'82. The diseases which appear to be the most prevalent in the colony are diarrhea, dysentery, fever, debility, and phthisis. The autumn season is the worst.

The wet seasons are from April to August and December and January. The so-called dry seasons from August to November, and February. The comparatively cool season is from November to May, when the NE. trade reaches the shore with some force.

The temperature ranges between 75° in December and January to 90° in August and September; the mean annual temperature of Georgetown is 81°.

The climate of Dutch Guiana is similar to that of British Guiana, but French Guiana is more unhealthy, being more subject to malarial influences. The Salut isles are reported to be unhealthy in the rainy season.

The rainy season is from December to April or May, but rain falls at all times; it must be under nearly the same influences as Demerara to the westward, which has two wet seasons as above stated.

BRITISH GUIANA AND THE ORINOCO RIVER.

British Guiana.—The seaboard of the colony of British Guiana is comprised between the Orinoco and Corentyn rivers, an extent of 270 miles. The colony has an area of about 109,000 square miles and is divided into three counties—Essequibo, Demerara, Berbice, so named from the three principal rivers which drain them. Demerara occupies the center of the seaboard; to the NW. of it the county of Essequibo extends along the coast toward the swamps and forests of the western frontier; and to the SE. lies the county of Berbice.

The governor is assisted by a court of policy (nine members) and a combined court.

The population in 1890 was 282,066.

The colony has 23 miles of coast railway, 275 miles of river navigation for light craft, good roads, and telegraphic communications with Europe.

Communication.—By British packet every fortnight; by French packet every month. There is also a steamer from Amsterdam every three weeks to Dutch Guiana.

Orinoco river.—The outer edge of the delta of this great river extends along a seaboard of about 150 miles. In this space are the mouths of six considerable streams, which become united to the main trunk about 100 miles within the Boca Grande, its eastern and principal mouth.

The depths in these streams naturally change with the seasons, and during the rains (from the latter part of January to the middle of June) the northern part of the delta to the westward of Mangles point is submerged, and the inhabitants are obliged to reside in the trees. Four of these branches unite near the town of Barrancas, and enter the Orinoco about 100 miles above Cangréjo island.

The navigable entrance of the main branch of the Orinoco—generally termed the Boca Grande—between Cangréjo, or Crab, island and Barima point, is about 10 miles wide, and on the bar there are 16 feet at high water, which depth is very little affected by the annual rise and fall of the river.* Westward of the entrance of the Barima the shore forms a bay to the southward, and the mouth of the Orinoco between Cangréjo island and the main is about 4 miles across; the south extreme of Cangréjo island appears as a bluff and is readily made out.

Telzereo island is not indicated on the charts and has been formed since the last survey of the river. It is situated eastward of the SE. extremity of Cangréjo island, with only a boat passage between. It is about 1½ miles in length, in an east and west direction, and is covered with trees about 20 feet high. New islands are forming to the northward and eastward of this one, and Cangréjo bank has apparently extended greatly to the southward.

There is at present much less water on Cangréjo bank and in the channel than is indicated on the chart, only 7 and 8 fathoms being found in the channel where the chart shows 13 and 15 fathoms.

Soundings taken by the *Kearsarge* in the channel between Cangréjo island and bank and the south shore of the Boca Grande to the westward of Amakura river gave depths of 5½, 5, and 4 fathoms, finally decreasing to 3 fathoms at her anchorage near position of pilot vessel, with a soft, muddy bottom all the way along.

The southern shore of the mouth of the Orinoco from Mocomoco point takes a westerly direction for 9 miles to Sabaneta point, and from thence it trends WSW. 5 miles to Barima point, at the mouth of the Brazo de Barima. This river communicates with the Guayma by

---

* November 7, 1892, the steam launch of the U. S. S. *Kearsarge* found an almost invariable depth of 18 feet while crossing the bar.

Mora creek, which is navigable for large canoes. The land about the entrance to the river at Boca Grande is very difficult to recognize and unless the weather is very clear nothing can be seen. There is now no mark for Barima point, the trees being much the same height. Sabaneta point can not be recognized when approaching from the northeastward. At about 10 miles southwestward of Barima point is the entrance of the Amakura river, which forms the boundary between British Guiana and Venezuela. There are police stations on both sides of this river.

In the month of April, off the main branch of the Orinoco, the water is sometimes fresh at 15 or 20 miles from the land.

Navigability.—The Boca Grande is navigable at all times of the year. Vessels of 15 feet draft have no difficulty in reaching Bolivar, about 228 miles from its mouth, from May to December, inclusive, but for the remainder of the year 11 feet is about the maximum draft that the river is available for. Sailing vessels take sixteen days or more to go up from July to September, and about six days to come down. The passage up is shorter during the remainder of the year, but longer in coming down. Sailing vessels rarely visit it now.

Shoals.—The bar off the entrance, as previously stated, usually maintains a depth of 16 feet, with a rise of about 3 feet, and but little affected by the height of the river. The tide does not affect the river above Barrancas, about 110 miles up. *Below Barrancas some distance vessels usually take the Imataca arm, as the channel in this branch is greater in depth than the main river. The Yaya pass is the only shoal spot in the river after passing over the bar at its mouth, and in crossing soundings of 3½ and 4 fathoms of water were found. The pilot stated that in March there were only 2 fathoms, while in August the depth increased to 10 or 12 fathoms. The next shoalest spot was off Angosturito point, 10 miles below Bolivar, where the lead showed 5 fathoms; the remainder of the river varied; in the channel from 7 to 20 fathoms were found, except at the anchorage off Barima point, where there were but 3 fathoms, with a soft, muddy bottom. Palo Sola, between Las Tablas and Mamo, is a dangerous place, owing to the powerful eddies at that point; it is also obstructed by rocks, and requires a close and constant attention to the helm to avoid them, the currents being very strong and erratic. The same remarks apply to Rosario, and it is necessary to watch the steering closely in order to avoid being carried by conflicting currents upon the adjacent bank. Panapana is likewise dangerous on account of a submerged pinnacle rock that has but 5 feet on it (November, 1892), and on no account should an attempt be made to pass this vicinity at night or in bad weather when adjacent landmarks can not be distinctly made out.

---

*From report of Commander A. S. Crowninshield, U. S. Navy, commanding U. S. S. *Kearsarge*. The *Kearsarge*, drawing 15¼ feet, ascended the river to Bolivar in November, 1892.

Current.—The current varies in strength at different seasons of the year, and also in different parts of the river. The pilots state that the current runs from 6 knots in the very narrow parts of the river to 1½ knots where the river expands to 4 or 5 miles.

The *Kearsarge* found a current of 2 knots at Bolivar on November 11, 1892.

Height of river.—The river is highest in August, the average rise being over 50 feet. The highest water on record was attained in August, 1892, when it is estimated to have risen to a height of 60 feet above mean low water.

The depth in the passes varies from year to year, and can never be absolutely depended upon. The best months for transport in the river are said to be August, September, and October; but the river is now navigated to Bolivar at all seasons by steamers of 11 feet draft. At high river it is available for vessels of at least 15 feet draft.

Lightvessel and Lighthouse.—No light is shown from the lightvessel off Barima point.

The vessel is principally intended as quarters for pilots, and the light is only shown when pilots go out over the bar to bring in a vessel and expect to return with her during the night. This happens but rarely, according to the chief pilot, having occurred but twice in the last twenty years.

The vessel has but one mast, and November 14, 1892, was moored in 21 feet of water, on the following bearings:

Sabaneta point, N. 85° E. (N. 85° E. mag.).
Barima point, S. 55° E. (S. 55° E. mag.).

As the vessel rides at single anchor and is exposed to the full effect of wind and sea from WNW. to ENE., she is liable to drag in heavy weather, and the position, though correct for the day given, is not to be depended on.

A lighthouse is to be constructed on the eastern end of Cangréjo island by the Venezuelan Government.

Pilots.—The pilot stations formerly on Cangréjo island and at Curiapo have been abolished, and all pilots are quartered on the pilot vessel off Barima point, where they can be had at all times.

As the pilots never come outside, it is necessary to obtain one at either Trinidad or Demerara. If this is impracticable it will be advisable to come to anchor in not less than 4 fathoms and then send a boat into the lightvessel for one. As there are no possible marks for crossing the bar, a pilot is indispensable. Pilotage is not compulsory; the rates are a matter of agreement, but the charges are reasonable.

A vessel attempting the ascent of the river without a pilot and coming to grief in consequence would forfeit her insurance. The same penalty attaches to a vessel which suffers damage while under way between sunset and sunrise, even though a pilot be in charge. Pilotage is free to all vessels both ways between the bar and Bolivar, the pilots being paid by the Venezuelan Government, the latter levying a duty, or certain percentage, on the value of the cargo brought in.

Anchorage.—There is good anchorage anywhere inside of the bar, in a depth of from 18 to 22 feet, with soft, muddy bottom and good holding ground.

Boat landing.—The landing is around Barima point, at one of the English stations on the south shore of the Orinoco.

Tides.—At Barima point it is high water, full and change, at 6h. 0m., and springs rise about 3 feet; when the wind blows strong and for a length of time from the northward and eastward the water occasionally reaches 4 feet above mean low water, but this is exceptional. At 30 miles above this the flood will make at 2h. 20m. At the mouths on the edge of the delta, westward of Mangles point, the rise is 7, 8, and even 10 feet within the gulf of Paria.

The flood tide sets to the westward, the ebb to the eastward; the latter is much stronger and reaches a maximum strength of 2 knots per hour.

Directions.—The land about the entrance of the Boca Grande is very difficult to recognize, and unless the weather is very clear nothing can be seen. Barima point is not easily distinguished, the trees being much the same height, but these are visible a distance of 15 miles in clear weather. On the western side of the entrance the trees are much lower and their continuity is interrupted by the mouths of the smaller branches of the river. The lead must be constantly attended to.

Sailing vessels should approach cautiously the mouth of the Orinoco and endeaver to make the land well to the eastward of Mocomoco point. This, however, requires great caution, as the trees only become visible when in 2½ or 3 fathoms of water, Guayma bank must also be looked out for. There is great danger in approaching the Orinoco river if land is not first made to the eastward, for a vessel may be suddenly aground out of sight of land, and as there is a NW. current of 1½ to 2 knots an hour, a vessel to leeward will find great difficulty in working up against the current with the prevailing light breeze. Steamers should endeavor to make Mocomoco point, which, from the salient position, can not be mistaken, and if land be first seen to the *westward* of this point haul out.

The depth gradually decreases towards the shore, but to the northward of Sabaneta point, at the entrance of the Orinoco, there are only 2½ fathoms when nearly out of sight of it. Mocomoco point may be approached to the depth of 3½ fathoms, but between it and Sabaneta point is a shoal of soft mud and there is no channel.

As before stated, it is advisable to anchor in about 4 fathoms and send boat to lightvessel for a pilot, if one has not already been obtained. There are no marks for crossing the bar and a pilot is indispensable. The ascent of the river without a pilot is dangerous.

Ciudad Bolivar, formerly known as Angostura, is about 228 miles from the mouth of the river, at an elevation of 190 feet.

The city is first seen after rounding Angosturito point, 10 miles distant. The most prominent object is the cathedral on the hill, although the whole city is in plain view. It has also a town hall, a hospital, and a college. There are no regular wharves or boat landings. Boats land on the banks as convenient and vessels unload into lighters.

Population in 1888 was about 11,000. The United States is represented by a consular agent.

Barrancas and Las Tablas are the only villages of any size or importance between Bolivar and the sea.

The position of Marketplace point is latitude 8° 9′ N., and longitude 63° 33′ W.

Supplies.—Water is plentiful, being taken from the river. There is no coal, and wood is even scarce. Provisions are expensive and by no means plentiful. There are no facilities for repairs.

Water.—The confluence of the Caroni river, a little above the village of Las Tablas (165 miles within Barima point), is an excellent place for watering, its water keeping clear and transparent amidst the turbid waters of the Orinoco for a considerable distance, though the latter is by no means unpalatable or unwholesome.

Communication.—There is regular communication between Bolivar and Trinidad by river steamers, which ply between those ports two or three times a month and connect with the English mail.

Anchorage.—The river at this point is extremely deep, and the anchoring ground contracted in consequence. The best anchorage is to the eastward of Marketplace point, opposite the club house, where, however, a vessel must moor head and stern, and near the beach, in 10 fathoms. At a short distance from the shore are 18 fathoms, at the mean level of the river; and in mid-channel soundings can not be obtained, except in the dry season, in consequence of the great velocity of the cross currents; the extreme depth of this period is stated to be from 30 to 50 fathoms.

The current in these narrows runs about 5 knots an hour in December, when the river is at about half ebb. The width between Marketplace point and the rocks below Soledad, on the left bank of the river, is 776 yards at the mean level, but above as well as below these narrows it not unfrequently expands to 3 miles.

Winds.—Strong winds from the westward are experienced at Bolivar from July to October, and during the rest of the year their direction is about NE. or up the river; sometimes in December smart squalls from the northward come on.

Climate.—The climate of the Orinoco is not unhealthy. At Bolivar intermittent fever is prevalent at times, and occasionally beri-beri; the worst period is after the greater rains.

In 1857 there was an epidemic of yellow fever, and in 1866 much sickness was caused by excessive rains.

In the delta of the river there are the greater rains from April to

July, when portions of the delta are submerged, and in the short rainy season in December and January, but rain occurs in most months.

Port Manoa, or Imitaca, is near Imitaca river on the main branch of the Orinoco, about 70 miles above Barima point.

There are depths of 6 to 7 fathoms in the center of the stream and 2½ to 4 fathoms very close to the banks, the only danger being a ledge of rocks which, however, are sufficiently marked by the ripple over them. The loading place, Manoa (Imitaca), for vessels is on the bank of the river, and vessels can lie close up and load to any depth required.

Table of distances, by Lieut. J. Murray, R. N.; Orinoco River.

From—	Nautical miles.	Distance from Barima point in nautical miles.	Remarks.
Barima point to Cangréjo	12	12	Pilot establishment formerly.
Cangréjo to Curiapo	25	37	Indian village.
Curiapo to Imataca	25	62	Commercial port, Manoa or Imataca.
Imataca to pass of Yaya	60	122	Apex of delta. Macareo river branches off towards Trinidad, and is much frequented by small craft.
Pass of Yaya to Barrancas	4	126	Considerable trade in cattle.
Barrancas to Guiana Vieja	17	143	Deserted capital.
Guiana Vieja to Las Tablas	19	162	Considerable trade in cattle.
Las Tablas to pass of Mamo	31	193	A depth of 12 or 14 feet at low river.
Pass of Mamo to pass of Rosario	13	206	Deep, but dangerous, eddies and many rocks.
Pass of Rosario to pass of Panapana	6	212	Not less than 13 feet at low river.
Pass of Panapana to Bolivar (Angostura).	16	228	Capital of the province.
		Distance from Bolivar.	
Bolivar to Muitaco	62	62	Village on the right bank.
Muitaco to Quanàre	17	79	
Quanàre to Boca del Infierno	12	91	River rushes through a rocky pass 150 yards wide, and deep, eddies very dangerous, especially when the river is high.
Boca del Infierno to Mapire	16	107	Village on the left bank, the river 1,657 yards wide and 8 fathoms deep.

Loran mouth of the Orinoco, about 24 miles northward of Boca Grande, is navigable for small craft by those locally acquainted.

Macareo river.—This branch of the Orinoco, about 100 miles NW., of the Boca Grande, and on the south side of the Serpents mouth, is entered over a bar with 10 feet at low water, extending 5 miles from the land; inside, the depth increases to 5 fathoms, and the navigation is easy as far as Zebirgo point, off which there is a long spit where the water is shallow and the channel narrow; this point is at the junction of the Pedernales river. The river again deepens southward of this until nearing the junction with the main stream, where it again shoals to 12 feet for about ½ mile in the Mata Mata pass.

This entrance to the Orinoco is the best for steamers of less than 8 feet draft from the westward, being a shorter route than by the Boca Grande; pilots can be obtained at Trinidad.

Gannet shoal, with a depth of one fathom mud and 5 to 6 fathoms close to, is charted about 4½ miles northward of the Macareo river.

The 5-fathom line of soundings is from 4 to 6 miles distant from the south shore of the Serpents mouth, where it is stated to decrease gradually towards the shore, but it has not been surveyed.

Cuscuina and Pedernales mouths, about 16 and 34 miles, respectively, westward of the Macareo, are only suitable for canoes.

Vagre river discharges into the south part of the gulf of Paria, and is the western mouth of the Orinoco. It has two entrances, the eastern one, known as the Manamo mouth, enters the gulf between Foleto point and Pesquero island, in common with the Pedernales river, and is navigable for small vessels. The western entrance enters the gulf between Venado island and the mainland.

Corcoro islands.—From Mocomoco point to Duck point, at the entrance of Guayma river, the coast trends for 26 miles, and about midway, close to the shore, are the Corcoro islands. All this part of the shore is but imperfectly known, and shallow flats of mud, sand, and shell extend out of sight of the land.

Waini, or Guayma, river.—The entrance of this river faces the NW. and is about 2 miles wide, with a depth on the bar of only 6 feet at low water neap tides, increasing just within the mouth to 13 feet. From the east entrance point a bank of sand and shell, that breaks heavily, stretches off about 2 miles and is dry in places at low water. From the western point the shore trends northward for 5 miles to Duck point, and is skirted by a shallow mud bank, leaving a channel across the bar between it and the sandbank about one mile wide.

Caution.—The entrance of the Guayma may be recognized by three remarkable trees (if they still exist) on Brand point, about 2 miles from the mouth on the western shore, described by most navigators as three hills. Behind them are low bushes and to the north and south thick forests. Great care should be taken in approaching this part of the shore, for on Guayma bank, lying N. 34° E. (N. 34° E. mag.) of the entrance to the river there is only a depth of 10 feet at the distance of 10 miles from the land. A vessel in passing should, therefore, not come within the depth of 4 or 5 fathoms.

Tides.—It is high water, full and change, at the entrance of Guayma river at 4h. 10m.; springs rise 7½ feet. The flood stream sets across the entrance to the SW., the ebb to NW.

Arabian, or Aroabishi, coast.—From the entrance to the Guayma the coast trends SE. to the Pomerun river, passing the Waini (Guayma) shell beach and the Moruka river; it then continues ESE.

to Cozier point. From Cozier point it trends SSE. for 18 miles to Hampton court, the most northern estate on this coast, and then takes a southerly direction for 12 miles to abreast the north end of Tiger island, at the west entrance of the Essequibo.

The coast is low, wooded, and swampy, and quite devoid of any remarkable features; the peculiarities existing could not be made out by a stranger, supposing the draft of his vessel allowed him to approach the coast sufficiently near to observe them.

The two beaches, composed of shell, and locally known as the Waini (Guayma) and Moruka beaches, are landmarks, but are difficult to see except in the forenoon, and only then when a vessel can get within 5 miles of the land.

The mouth of the Moruka is distinguished by detached clumps of trees, which from some points of view appear as four.

The entrance to the Pomerun is not seen until on a southerly bearing; the trees are high and regular on the east (Pomerun) point, lower and irregular on the west entrance point.

Cozier and Chandler creeks are difficult to find; the latter is said to be dry at half ebb.

From Cozier point to Hampton court estate, the northernmost on this coast, which has two tall chimneys of nearly equal height, the sea is said to be encroaching, and appearances confirm this statement.

Danger.—No fear need be had if the lead is kept going on approaching this part of the coast. The soundings shoal gradually and the bottom is soft.

The dangers that may be mentioned are the Pomerun, Chandler, and Devonshire Castle flats, but no vessels except those of the lightest draft, can approach them, and for those the flats are a convenience, the water being generally smooth, and the anchor may be dropped on them for the night with advantage.

The neighborhood of Cozier point has a reputation for bad weather and heavy seas.

Landing.—At the shell beaches and Hampton Court sluices, landing can be effected in fine weather and at high tide, but, as a rule, it would appear to be impracticable.

Current.—During the examination of this coast in the month of March the current was found to be setting generally to the NW. about 1½ knots.

Moruka river.—The entrance is obscured by trees and is not visible from a short distance seaward; at the eastern point, however, there are some clumps of trees.

Bayne river has been searched for, and it is asserted as not existing, there being only a few small creeks which dry at a quarter ebb between the Waini and Moruka rivers.

Pomerun river is not of the slightest use to any but vessels of the lightest draft, on account of the extensive mud flats off the entrance

They, in all probability, dry right across at low water springs. The mouth of the river is 300 yards broad with a depth of 18 feet.

Essequibo river is the principal river of British Guiana and rises in the sierra Acarai, and after a course of at least 600 miles, empties into the sea by an estuary about 15 miles wide. In the entrance of this river are the large islands of Wakenaam and Leguan, from which shoals and sandbanks extend from 10 to 15 miles seaward. The prinprincipal entrance into the river is the eastern one, between the Leguan and Sugar banks on its north side and the Boerasiri and Blue Jacket banks on the south or Demerara shore. There are also channels between Leguan and Wakenaam islands, and between the latter and Tiger island which lies close off the western shore; but they are only used by droghers. Vessels of 16 feet draft can ascend to Makuri creek, about 40 miles from the mouth. The produce from the Essequibo estates is conveyed by droghers for shipment at Demerara.

The Essequibo has been ascended about 230 miles in a direct line from its mouth; the rapids and cataracts are, however, very numerous and dangerous. The first rapid is at about 90 miles from the mouth, and to this point the river is navigable for large trading canoes. At about 15 miles from the entrance is the island of Zeelandia (now known as Fort island), upon which may still be seen the ruins of the first Dutch settlement in Guiana. About 30 miles above this the Mazaroni river enters from the westward; the bed of this river is full of rocks and the rapids are numerous. On the point of confluence there is a missionary station named Bartika. At about 5 miles within the mouth of the Mazaroni, the Cuyuni, which also enters from the westward, communicates with the Orinoco, and is navigable for about 300 miles.

A short distance below where the Cuyuni enters the Mazaroni the north bank rises to the height of about 100 feet, and on this is placed the penal settlement.

About 5 miles below the confluence of the Essequibo and Mazaroni the Boessel and Makuri creeks enter from the eastward. Vessels drawing 16 feet sometimes load here.

Penal settlement.—This is a place to which all the worst felons of Demerara are sent for isolation from the colony. It is a well ordered establishment, and partly industrial; granite exists in this locality and is broken out by the convicts for shipment to Georgetown, for the construction of sea walls and other purposes. Hard woods are also cut and shingles made. The settlement is supplied every month from Georgetown by steamers, and at the same time officially inspected.

West channel.—The entrance to this channel is almost out of sight of land; only in the clearest weather the chimneys on Wakenaam and Tiger islands can be seen. The Estate chimneys to the westward are no guides to the entrance.

The eastern side of West channel is formed by the edge of a sandbank, stretching off Wakenaam island to a distance of over 10 miles.

There is a depth of 10 feet in the entrance, but southerly from No. X beacon the water gradually deepens to 3½ and 4 fathoms between Tiger and Wakenaam islands, where it is 1½ miles wide. The channel is subject to constant change, and no reliance can therefore be placed on the chart.

The inner part of West channel is formed by the west side of Wakenaam island, parts of the Arabian coast, and the east side of Great Troolie island.

No. X beacon.—In latitude 7° 11′ 45″ N., longitude 58° 22′ 45″ W., is placed a large triangular black beacon (locally known as No. X), in 6 feet at low water. Within the beacon is Oene bank. Southeast of the beacon, about one mile, is a bank which dries at low water, and breaks heavily even in moderate weather; between is the entrance to West channel, with 10 feet in it at low water springs.

Zorg beacon, situated on a bank which uncovers at low water on the western side of West channel, bears from No. X beacon S. 34° W. (S. 34° W. mag.), distant nearly 5 miles; at ½ mile south of Zorg beacon is an old beacon; between these is a shallow channel of 3 and 4 feet.

Buoy and beacon.—Shallow water extends about 4½ miles northeastward of Great Troolie island, dividing the channel. At 2½ miles from the island is a black buoy, marking the SW. extreme of a sandbank, one mile in length and dry at low water. A beacon with ball marks a bank in fairway between Great Troolie and Wakenaam islands.

Tiger island, on the western edge of West channel, is 5½ miles long, north and south, by ½ mile in width; the southern extreme is west, distance 2 miles from Zeelandia. The southern and eastern sides of this islands are faced by sand, which gives it a conspicuous appearance, in contrast with the monotonous coast to which it is adjacent. On the eastern side, at 1½ miles from the northern extreme, there is a particularly white sandbank, 3 feet above high water; this shows distinctly from all points of view. The sand dries ½ mile off this bank, forming the western edge of the channel.

Sandbanks.—On the eastern side of the channel, at ½ mile from the western side of Wakenaam island, is a narrow sandbank, which uncovers at low water; it is very narrow, and ½ mile in length, extending parallel to the eastern shore, with a good channel between. Shallow water with one small dry bank extends from this bank parallel to the shore.

On the western side of Wakenaam island is the conspicuous pier, or stelling, painted white; a courthouse is erected near the extremity, which shows out very distinctly; it is situated 4 miles from the south point. The southern part of West channel, east of Great Troolie island, is only ¾ mile wide, in some places being 10 fathoms deep. Westward of the southern part of Wakenaam island, a shallow bank extends parallel to the shore, the depth over it varying from one to 8 feet, leaving a channel eastward of it ⅛ mile wide; this is used by steamers to avoid the strong flood stream which sets in mid-channel.

That portion of the Arabian coast which may be said to form the western side of West channel lies opposite the central part of Wakenaam island; the only two conspicuous estates on this coast are Aurora and Spring Garden, the latter being the most southern cultivated spot on that coast; it is distant from Zeelandia 3½ miles in a southwesterly direction. From the south extreme of Tiger island, and almost parallel to the coast, extend detached narrow sandbanks, with channels among them having depths of 2 or 3 feet at low water. The channel between Tiger island and the mainland has a depth of from 15 to 18 feet, with a breadth of less than ½ mile; the entrances to this channel, both north and south, are very shallow.

Middle channel.—Wakenaam island, 9 miles long and 3 miles wide at the north part, lies northwestward of Leguan island, from which it is separated by Middle channel, the average breadth of which is one mile. The bar, with 4 feet on it, lies 6 miles seaward from the NE extremes of Leguan and Wakenaam islands. A small island, named Kiwakewaraba, lies in 55° east (N. 56° E. mag.), distant ¾ mile from the east extreme of Wakenaam island, and close to the northern edge of the channel. From this island the sandbank trends E. by N. for 2 miles, forming the north side of the channel; the southern side is defined by an extensive sandbank, 4½ miles long, stretching off the northern extreme of Leguan island, in a NE. by E. direction. No leading marks can be given for Middle channel, and the tops of the chimneys seen over the mangrove trees are difficult to distinguish one from the other. From the bar the water gradually deepens to the southwestward, there being 19 feet between the NE. extremes of the two islands, again shoaling to 11 feet between the southern extremes. The channel is subject to change and can only be navigated by those acquainted with it.

Hog island.—The northern extreme of this island lies between the south points of Leguan and Wakenaam islands; the channel formed between it and Leguan island is clear, having 10 feet in it at low water, and being nearly ½ mile wide. A dry spit extends off the northern extreme of Hog island, the outer edge lying ½ mile off shore, and marked by a circular white beacon, which is placed in 8 feet at low water; a beacon is also placed on the eastern edge.

The channel between Hog and Wakenaam islands is narrowed by a shoal extending off the latter island, and by a sandbank, with only one foot over it at low water, lying in mid-channel south of the southern point. A black buoy and a red buoy mark the channel, which carries a depth of 8 feet, and a small beacon is placed close off the southern edge of Wakenaam island, marking a very small spit. The buoys and beacons are only placed to guide the passenger steamers which ply three times a week between Georgetown, Leguan, Wakenaam, and the Arabian coast.

Caution.—Neither West nor Middle channels can be recommended as suitable for vessels to run into. Formerly vessels of small draft attempted West channel, but owing to the number of causalties that happened and the great damage done to cargo it has been totally discontinued. It is not safe to try the intricate channel between the north point of Hog island and eastern side of Leguan, consequently Hog island has to be rounded on the southern side, which entails a very tedious passage.

Ship channel, the main entrance into the Essequibo, is the eastern one between Leguan and Sugar banks on its seaward side and Leguan island and the Boerasiri and Blue Jacket banks on its inner side. Between the outer banks, at a mean distance of 8 miles seaward from Leguan island, is a bar about 3 miles wide, with a depth of 10 feet at low water springs, which gives a depth of 19 feet at high water springs and 16 feet at high water neaps. From the entrance of Boerasiri creek a coarse sandbank, the Boerasiri and Blue Jacket banks, which uncover in places, extend N. 55° E. (N. 56° E. mag.) for 6 miles, with depths of 2 fathoms only at 4 miles beyond; and off the NE. extreme of Leguan island lies Dauntless island, with trees on it 30 to 40 feet high, northeastward of which Dauntless bank, with 2 to 10 feet water over it, extends 7 miles, with depths of 2 fathoms only at 5 miles beyond. Between these banks lies Ship channel, which is from ½ to 2 miles wide.

Sugar bank.—This bank of hard sand, with 6 feet water over the space of ½ mile NE. and SW., lies in the fairway of Ship channel. Its NE. extreme is situated N. 9° W. (N. 8° W. mag.) 9¼ miles from Demerara lighthouse.

Beacons and buoys.—The NE. extreme of Leguan bank is marked by a beacon with a square top. A can buoy, painted black, surmounted by a triangle, is moored 800 yards northeastward of the depth of 6 feet on Sugar bank in 15 feet. A black can buoy, in about 9 feet, lies the same distance SW. of the Sugar bank; these mark the north side of Ship Channel fairway.

A red can buoy in about 9 feet marks the south side of the fairway; it lies 1,400 yards southward of Sugar Bank buoy. The water shoals gradually to the shore southward of this buoy. A beacon with square top, in about 12 feet, is placed about 600 yards northward of the east extreme of Blue Jacket bank, about 3¾ miles westward of this buoy; it also marks the south side of fairway. The SW. extreme of Blue Jacket bank, north side of gut between it and Boerasiri bank, is marked by a black can buoy. A beacon marks the south side of this gut, and there is another beacon about 1,200 yards eastward of it. Their positions, as charted, must not be depended upon.

Directions for Essequibo river.—From a position a short distance north of Demerara lightvessel, a N. 74° W. (N. 73° W. mag.) course will lead to Sugar Bank buoy at the entrance of Ship channel, allowance being made for the flood tide which sweeps across that bank;

thence southward of Sugar Bank buoy and northward of Blue Jacket beacon, and having passed the Leguan and Blue Jacket beacons, Dauntless island and the land about Boerisiri creek will be in view. The entrance of the river will now be open and may be steered for.

The sands on both sides of the channel are steep and must be approached with caution.

There is an inshore channel at high water for small vessels; it lies between Boerisiri Bank white beacon and a buoy northward of it. There is a black beacon to the eastward which vessels must pass southward of.

Vessels sailing up or working out of Ship channel should always keep north of Middle bank, which is nearly midway between the shores. In sailing up, the wind is invariably free.

When working down, attention must be paid to the ripple on the banks as well as to the leading marks; the black buoy on Middle bank must not be approached too close, as the bank is very steep.

Anchorage.—Westward of the Sugar bank, in Ship channel, there is good anchorage in every part. The tides, however, are very strong, causing a confused and dangerous sea for boats.

Middle bank.—This bank lies nearly parallel to either shore, and is a ridge of broken sand, having from 5 to 10 feet over it, with the exception of a small dry patch, the south end of which bears S. 80° E. (S. 79° E. mag.) 1½ miles from the south end of Leguan island; a black buoy in 9 feet marks the southwestern edge. On the eastern side of the channel, lying eastward of Middle bank, at 200 and 400 yards off shore, are two buoys, marking the ends of a narrow bank of sand with 5 to 10 feet on it. These buoys are placed for the use of the local steamers on their passage to the penal settlement.

Demerara river.—This river is said to have its source in about latitude 5° N., from which it takes a northward course, nearly parallel with the Essequibo, for about 200 miles to the sea. The approach is obstructed by a mud flat 5 miles broad, within the depth of 10 feet, and having over the larger portion a depth of only 9 feet, but it is navigable at highwater springs for vessels drawing 17 to 19 feet. These, however, often miss the highest springs and lie aground until the next; but the mud is so soft and the weather so fine that no injury occurs. Vessels of a little less draft generally cross the bar with the aid of tugs at any ordinary high tide, the chance of grounding being preferred to the inconvenience of completing their cargoes 9 miles off. Abreast the town wharves, for a distance of 2 miles, there are lowwater depths of 3½ and 4 fathoms, mud bottom.

For about 65 miles, as far up as Luckie, the river is navigable at high water for vessels drawing 12 feet, and for boats to the rapids, about 95 miles from Georgetown.

At the mouth the river is about ¾ mile wide; at the Sand hills, 25 miles up, it is a ¼ mile across; at Christianburg, 33 miles above this, it is 160 yards; and at the post of Seba, 83 miles from Georgetown, it is 60 yards wide.

The Sand hills, which are situated on the left bank of the river, are about 70 feet high, and appear to be the commencement of a sandy ridge which alternately recedes from and approaches the river bank, and attains in some places an elevation of 300 feet. Below this the banks are low and thickly wooded, and when cultivated are obliged to be protected by dams and embankments.

Georgetown, the capital of the colony, is just within the mouth on the right bank of the river, occupying a space of about one mile in breadth and 2 miles in length from north to south. In 1881 it contained a population of 47,000.

The streets are generally wide, with canals, shaded by palm trees, running through them, and there are numerous public edifices. A railway connects Georgetown with Mahaika. The sanitary condition of the port is not good.

The United States is represented by a consul, vice-consul, and deputy consul.

Dock.—There is a dry dock 220 feet long at Georgetown, capable, at high water springs, of receiving vessels drawing 10 feet water. The charge for a vessel of 1,000 tons is $1.25 per ton the first day, 20 cents the second, and 15 cents the remaining days in dock.

Repairs.—Both steamers and sailing vessels can be repaired, but the means for lifting heavy weights are very limited.

Supplies.—Water has to be purchased; it is brought alongside in tank vessels for about $2.50 per ton; this is rain water. There are some wells, but the water is bad. The town is supplied with water brought from the interior by the Lamaha canal and conveyed by pipes to the houses and wharves; this water is tinted red from the roots and leaves of the forest trees; it is commonly termed bush water, and is dirty and can not be used for washing or cooking. At the Sand hills there is a spring of good water; vessels may lie close under and fill by hose. Further up, the river water may be taken in with the last of the ebb tide; it is quite fresh, but always muddy, and it takes a long time to settle.

Bread is about $4.50 per 100 pounds; vegetables, 4 cents per pound, both of which are good and plentiful; meat, 12 cents per pound and of poor quality.

Coal is about $6.50 per ton, and will be brought off in lighters, or a vessel can come alongside a wharf; about 100 tons a day can be shipped; about 9,000 tons are usually kept in stock.

Lights.—The lightvessel off the mouth of the river lies N. 37° E. (N. 38° E. mag.), distant 8¾ miles from Georgetown lighthouse, in 3¼ fathoms water, and exhibits a *fixed white* light, which in clear weather should be visible from a distance of 12 miles. The vessel has one mast and is painted red. The pilots reside on board. Position not to be depended upon, A large square blue flag is kept flying by day till a vessel heaves in sight, when the flag "S" of the International Code is hoisted as a signal to the lighthouse that a vessel is in sight.

When the lightvessel is taken into harbor for repairs a schooner is anchored in her place.

The lighthouse at Georgetown is octagonal and painted with red and white alternate vertical stripes; it is 100 feet high and exhibits a *revolving white* light every minute, at 103 feet above the mean level of the sea, visible from a distance of 16 miles; on the summit of the lighthouse there is a semaphore signal post.

A small fixed *red* light is exhibited from the lighthouse at Georgetown, to mark the extent of the breakwater at the NW. angle of the fort; and when visible indicates to vessels entering the river that they are to the westward and clear of the end of the breakwater. This light is visible with the lighthouse bearing S. 10° E. (S. 9° E. mag.) to S. 44° E. (S. 43° E. mag.), distant 3 to 4 miles.

A small *green* light is shown from the end of the ferry wharf, on the west side of the river entrance.

Caution.—Vessels coming from the seaward often sight the revolving light at Georgetown before that of the lightvessel.

Buoyage.—A black and white checkered buoy is moored in 12 feet on the outer edge of the bar to mark the fairway on entering the river, with the east point of entrance bearing S. 38° W. (S. 39° W. mag.), distant 4¾ miles.

A black can buoy in 9 feet is placed 3¼ miles SW. of it on the same side of the channel, with the east point of entrance S. 10° W. (S. 11° W. mag.), distant 2 miles.

A red buoy in 12 feet marks the quarantine grounds and lies with the east point bearing S. 32° E. (S. 31° E. mag.), distant about one mile. The fairway is to the eastward of these three buoys.

A white can buoy, marking a 9-foot patch, lies N. 36° E. (N. 37° E. mag.) of east point, distant 2½ miles.

Quarantine.—The health officer visits all vessels entering the river, and should he find it necessary they are conducted to the quarantine ground by the harbor master.

Hospital.—There is a seaman's and colonial hospital, at either of which the treatment is fairly good. Sailors can be sent to the seaman's hospital free of charge. Vessels are required to pay hospital dues.

Port charges.—Beacon and harbor dues, 25 cents per registered ton; for clearing to Government secretary's office, $3.33; for clearing to sheriff's office, $1; harbor master's fees, 2½ cents per registered ton; hospital dues, $4.50. There are also several other charges of a minor nature. The port is a very expensive one for vessels to visit, and it is well for owners chartering to Demerara to be careful about the terms and construction of their charter, and, moreover, to keep a very close tally when discharging into lighters, in which case no receipt can be procured for freight, and goods are stolen.

NOTE.—Between the hours of 8 a. m. and 4 p. m. the authorities will not allow the crews of vessels to work in the sun. Heavy fines are imposed for the breaking of this regulation, and it necessitates the spreading of awnings or the employment of native labor; the only object of the regulation seems to be to force the employment of such labor.

Pilots and pilotage.—The pilots are negroes and are not to be entirely relied upon. They may be obtained for the Demerara and Essequibo rivers from the lightvessel, but should there be none on board a pilot tender is in communication with the shore to obtain one. Pilotage is compulsory and is as follows: Vessels drawing 10 feet and under, $12; 11 feet, $13; 12 feet, $18; 13 feet, $23; 14 feet, $29; 15 feet, $35; 16 feet, $41; 17 feet, $47; 18 feet, $53; 19 feet, $62; 20 feet, $72, and every foot or part of a foot over 20 feet, $10. According to local pilot regulations, pilots are not responsible for damage sustained by vessels under their control.

Tugs.—The services of tugs can be procured for towing vessels across the bar. The charges are exorbitant; vessels of light draft pay anywhere from $150 to $200; vessels of 18 feet have paid as much as $380. This is outward towage; inward towage, about 25 per cent less. In addition to towage, $10 must be paid for use of hawser. Vessels wishing to be towed out must drop down to entrance of the river, clear of the shipping.

Communication.—The Royal Mail Company's steamers call twice a month. Several other lines of steamers stop at stated times. Telegraph communication to all parts of the world.

Time ball.—A red ball is dropped (on Wednesdays and Saturdays) from the general post office flagstaff at noon, local mean time, corresponding to 3h. 52m. 39.5s., G. M. T. The ball is hoisted as preparatory 5 minutes before the signal.

Anchorage.—Vessels of war should moor in Demerara river, off the market clock tower, in 4 fathoms, 100 yards from the ferry landing, and one mile within East point, where anchorage is reserved for them and also mail steamers. Jib-booms should be housed. If securing to a wharf or stelling, use all the lines possible, as the wharves are weak, and the strong tides and winds are apt to carry a vessel adrift.

Tides.—It is high water, full and change, at Georgetown at 4h. 28m.; springs rise 9 feet, and neaps 6 feet. The stream attains the rate of 3 knots an hour in the dry season, and continues to flow on the surface for upwards of an hour after high water. At the Sand hills it is high water at 6h. 15m., and the rise is 9½ feet; at Christianburg at 8h. 30m., and the rise is 6 feet; and at Seba the tidal stream is lost in the dry season, but there is a rise of about a foot. In the rainy months the river has been known to rise 21 feet.

The ebb and flood streams off the mouths of Demerara and Essequibo rivers run in NE. by N. and SW. by S. directions, and extend to the distance of about 20 miles from the land, on the inner edge of the permanent northwesterly current. The flood stream at this distance runs with and somewhat increases this strength of the current, whilst the ebb retards it.

In the mouths of the rivers, the streams run with a velocity of 3 knots at spring, decreasing to 2 and 2½ knots outside them, and in the vicinity of the Demerara lightvessel. To the eastward of Demerara river the tides are felt only a few miles from the shore. In latitude 6° 50′ N. and longitude 57° 50′ W., with the land 10 miles distant, no tide was perceived.

The natural direction of the tide near the shore, except off the mouths of the rivers, is flood to the northwestward and ebb to the southeastward.

Current.—Off the coast of Demerara the inner edge of the current may be traced as far as latitude 70° 10′ N. in longitude 58° W. Between Demerara and Surinam it is sometimes as far out as 18 fathoms. During SE. winds it runs nearly 2 miles an hour to the NW.; with NE. winds its direction is more westerly and it is reduced to 1¼ knots. The flood stream somewhat increases and the ebb retards this current as before stated.

Rollers—The rollers on this coast occur principally in December and January, when strong northeasterly winds prevail; they begin where the ground shoals irregularly, and sometimes are sufficiently heavy to overwhelm small vessels when caught in an unmanageable condition. As a rule the whole coast within the 5-fathom line, where sand or hard mud banks exist, is subject to these rollers, which at times are highly dangerous to boats when close to the shore.

Directions.—From whatever direction Demerara river is approached the edge of soundings or the land should be made well to windward. This must be most carefully attended to, for if a landfall be made to the westward of the river there will be great delay in getting to windward, and it must be remembered that the Essequibo banks extend a long way from the land, and are a source of considerable danger if the lead be at all neglected.

The land east and west of the Demerara river is extremely low and flat; the kurida or mangrove trees, which fringe the shores of this extensive line of coast, are invariably of the same height, and the several chimneys of the sugar estate of Demerara are of the same shape and character, but Belair chimneys on the east coast are easily recognized by being a tall and short chimney close together. Windsor Forest chimneys 4 miles westward are two very tall chimneys, of nearly equal height and 100 yards apart. The spire of the Roman Catholic cathedral is also conspicuous. However, a vessel having obtained good sights and steering for the lightvessel will probably sight her first. The soundings decrease very gradually, and there can be no danger as long as the lead is kept going.

Having sighted the lightvessel from the eastward she should be approached bearing N. 68° W. (N. 67° W. mag.). If from the westward bearing southward of S. 23° E. (S. 22° E. mag.) a pilot may be obtained from the lightvessel who will take the vessel in when the tide suits.

To Enter.—From the lightvessel the leading mark is Vreed en Hoop chimneys open of the NW. corner of fort William, at the east point of entrance, bearing S. 41° W. (S. 42° W. mag.) passing eastward of the checkered black and white buoy; thence across the bar in a depth of 19 feet at high water springs and 16 feet at high water neaps; thence eastward of the black buoy and the red quarantine buoy, when the river will fairly open, bearing in mind that the flood sets in at about 3 knots an hour. The white buoy marking the 9-foot patch on the bar may be passed on either side.

The vessel will be visited under the direction of the harbor authorities.

Vessels from Trinidad and the Caribbean islands should not come southward of the parallel of 8° N., until they can fetch to windward of Demerara, more especially in the summer months, when the wind is from SE. and the permanent northwesterly current is at its strongest. Should a vessel strike soundings of about 30 fathoms (sand and shell) when crossing the parallel of 8° N. she will be about on the meridian of Demerara, and rather too far to leeward in the summer months. As a rule, the nature of the bottom when approaching Demerara should be fine dark sand; mud bottom denoting that a vessel is too far to leeward. Should the land be sighted when northward of 7° N., the vessel will be to the leeward, and should pay careful attention to the soundings to avoid the banks extending off the Essequibo. In working up, she should stand out to about 12 fathoms and into 4 or 5 fathoms, according to draft, anchoring if necessary whilst the tide is flood or adverse, and guarding against the strong indraught into the Essequibo.

From the eastward, when making the river with the flood tide, allowance should be made, as then the current and tide combine to sweep a vessel rapidly to the westward and southwestward. On all occasions a westerly set will be felt, as the ebb or NE. tide only lessens but never overcomes the northwesterly current. When abreast Mahaika river, the tops of the trees may be seen from the depth of 6 to 8 fathoms, and the tall chimneys previously referred to will be also visible in clear weather. From thence a vessel should run down in 5 to 4 fathoms, which will lead well clear of the spit extending 4 miles off shore eastward of Lusignan point, the only danger on that side, until near the lightvessel, from which she must take a pilot and proceed as before directed.

Until close to the entrance of the river, the depths reduce so gradually on both sides that there is not the slightest danger if attention is paid to the lead.

Should the tide not serve for crossing the bar, it will be better to wait at anchor, according to draft, near the lightvessel.

In working in or out, when reaching to the westward, it is necessary to tack with the first shoal cast, as the bank is steeper on that side and the flood sets strongly over the edge. The bank on the east side is very soft; that on the west a little harder, being partly of sand.

Upper river.—Vessels proceeding up Demerara river to the Sand hills will have to keep near the eastern shore for the deepest water. Between the estates of Herstelling on the east bank and Nismes on the west, there is a bar with 11 feet over it at low water; continue along the east side past the Great Diamond estate and up as far as the Vriesland estate; the islands in the center of the river will then be in view; either side of these may be taken, keeping rather nearer the shore than the islands, for shallows run off from and lie between them. Above the islands either side may be kept near until up to Glascow, 2½ miles below the hills. When the Sand hills come open a mid-channel course should be taken to the anchorage nearly abreast them in 3½ or 4 fathoms water.

Outer bank.—In latitude 7° 55′ N., longitude 58° 22′ W., a depth of 9 fathoms is found, from which a bank of hard sand with black specks, having 10 fathoms over it, extends in an ESE. direction for a distance of about 30 miles, with but little variation in depth; north of this bank the water rapidly deepens to 20 and 25 fathoms.

About 20 miles from the land the water becomes discolored, and patches of a dark, suspicious hue will frequently be met with; but there is no danger; the outer limits of this discolored water, however, will of course alter as the season is dry or wet. It has been observed that in the rainy season, between Demerara and Mahaiconi rivers, the water has a reddish tinge.

It may be useful to repeat that in front of the large rivers on this coast, to a considerable distance from the shore, the muddy bottom is mixed with shell, which is a good guide. The line of demarcation between the mud and sand bottom off this part of the coast is well defined; it takes the general direction of the coast line, and at a distance of 30 to 40 miles off.

The SW. elbow of a large area with sandy bottom lies in latitude 7° 10′ N. and longitude 58° W.; the line of demarcation between sand and mud is well marked and stretches NNW. 40 miles from this position, whence it takes a WNW. direction. To the eastward of this elbow it has been traced for 20 miles. West and southward of this line the bottom is mud.

Climate and seasons.—The climate is hot and depressing, but not considered generally unhealthy.

The wet seasons are from April to August, and December and January. The dry seasons from August to November, and February and March. There is often a great variation in these periods, but the above may be taken as an average of several years. December and January are often very wet months.

The temperature ranges between 75° and 90°, the mean annual temperature being about 81°.

Winds.—The most unsettled and stormy months are December and January, when sometimes it blows strongly from the NE., accompanied by hard squalls and rain. During March, April, and May the winds generally hold to the NE., but become gradually lighter; in June and July the land wind near the coast is often accompanied by heavy rain. From August to November the wind is generally from the SE. quarter, heavy rains are less frequent, and calms of several hours duration often prevail. During these months of light wind it was found that in general it veered to the NE. in the night, backing towards the SE. in the forenoon. Vessels working along the coast should take advantage of these changes.

In the short dry season wind prevail from NE. to east, and are squally, with occasional showers. In the long dry season they are moderate from east to SE. The mornings are generally hazy, but afterwards there is a clear atmosphere, particularly after noon. In the long wet period the wind is variable and the weather squally, with continuous heavy rain. In the short wet season the wind blows from the eastward in November and from northeastward in the other two months, and the squalls have intervals of fine weather between them.

During settled weather the wind draws round from ESE. to NE. about 3 p. m. daily, and continues at the latter quarter until after midnight, when it goes back again to the eastward. At the anchorage off Georgetown, in fine weather, the winds are generally from the SE. in the early part of the morning.

Lusignan spit.—At 5 miles eastward of the entrance of the Demerara is a low, grassy projection named Lusignan point; extending from the shore, at 5 miles southeastward of it, is Lusignan spit, with a depth of one fathom only at 4 miles off shore, increasing to 3 fathoms at 5 miles off. Vessels approaching from the southeastward should give it a wide berth. The coast is here fronted by a mud bank dry at low water, for the distance of about one mile.

Coast.—The coast, from the Demerara to the entrance of Berbice river, trends about SE. by E. for 50 miles, and presents no very remarkable features. It is fronted by mud flats to the distance of 6 miles. From the Berbice the coast sweeps gradually around to the SE. for about 30 miles to the west entrance point of the Corentyn river, and is very low and slightly wooded.

Mahaika river.—The entrance of this river is about 15 miles eastward of the Demerara. On its western side there is a large sugar boiling house, with two lofty chimneys, and to the westward of it a row of cocoanut trees. At 5 miles west of the river there is a large house on the coast, named Paradise, and at the back of it is situated the

Enmore estate, from the residence of which rises a white tower, sometimes seen from seaward between the trees. At about 3 miles westward of this house are Chateau Margaux and Mon Repos estates, with others, the chimneys of which may be seen from seaward above the bushes near the shore. A bank about 2½ miles in length, dry at low water, lies about one mile off shore, just eastward of the Mahaika.

Mahaiconi river flows into the sea about 7 miles eastward of the Mahaika, and the entrance is indicated by wooded points, the land being clear of trees on either side of them.

The shore about 7 miles westward of the Mahaiconi is fringed with trees, extending to Mahaika river, with gaps between them.

Abari river.—At 24 miles westward of the bar of Berbice river is situated the mouth of a small stream named Abari river, and near it there are two clumps of trees known as Eighteen and Nineteen.

The Mahaika, Mahaiconi and Abari rivers are navigable at high water for vessels of from 6 to 8 feet draft.

Caution.—When running along this coast the lead should be constantly used and a depth of not less than 4 or 5 fathoms maintained, according to draft; the latter depth is from 8 to 10 miles off shore.

Berbice river.—The entrance of this river is obstructed by a bar of sand mixed with mud and stones, with only 7 feet on it at low water springs; it is, therefore, only navigable at high water for vessels drawing not more than 16 feet; these may proceed as far up as fort Nassau, about 45 miles from the mouth, but those of lighter draft can ascend much higher. Vessels of 12 feet draft can ascend 105 miles, and those of 7 feet, 175 miles.

A bank of hard sand and shell, with depths of 7 feet and less, steep-to, and which breaks at low water, extends NNE. about 7 miles northward from the east point of entrance.

A mud flat extends 6 miles NE. from the western shore at the entrance; it is steep-to and dries in places at low water.

The main channel into the Berbice lies between these two banks, and is about a mile wide, but the edges are not stationary.

At a short distance within the entrance points the channel is divided into two, by a narrow, wooded islet, about a mile long from north to south, named Crab island.

The western of these channels is only available for small droghers, although it is said to be deepening.

The mouth of the Berbice is protected by fort St. Andrew on the east side, and by York redoubt on the west, nearly abreast the south extreme of Crab island.

Canje river.—About 2 miles above these forts, on the eastern side of the river, is the entrance to Canje river, which is navigable for small vessels to the first rapids, about 50 miles up, and is connected with Corentyn river by a creek. About 100 yards from Canje point there is a mud bank about 60 yards long, north and south, with 9 feet on it at low water.

New Amsterdam.—On the point which separates the mouths of Berbice and Canje rivers is situated New Amsterdam, a well built town. It has the advantage of being cleansed by tidal canals, which considerably adds to its healthfulness. Population, 1881, about 8,000.

Off New Amsterdam the river is 2 miles broad, but has only a depth of about 10 feet in it; as, however, the bottom is of soft mud, vessels can safely lie aground.

Pilots are stationed on the lightvessel, and will be sent to a vessel making the usual signal.

Lights.—From the lightvessel at the entrance of Berbice river is exhibited a fixed white light, visible in clear weather from a distance of 10 miles. The vessel is moored in 22 feet, at 9 miles N. 33° E. (N. 34° E. mag.) of St. Andrew point, is painted red, with the name Berbice on each quarter; the vessel is roofed over, and during daylight carries a white flag with red ball in center.

A fixed white light is exhibited from a boat moored one mile off St. Andrews point, visible about 6 miles. A small light is also shown from the tower of the town.

Directions for Berbice river.—Vessels bound to Berbice river should sight the land well to the eastward and run along in about 5 fathoms water, which will lead outside the rollers. As the channel is subject to change, strangers should employ a pilot. These directions should be used with caution.

Having waited until the last quarter flood, the lightvessel should be steered for, and on passing her, a S. 33° W. (S. 34° W. mag.) course will lead between the buoys on the bar. When a remarkable tree on the lowland to the eastward is just shut in with the bluff or clump of trees at the entrance of Devils creek, bearing S. 71° E. (S. 70° E. mag.), the water will deepen inside the bar to 18 and 20 feet at about 2 miles within the entrance of the river.

The channel will now decrease in width, and a vessel may keep so far to the eastward as to shut in half of Crab island with St. Andrews point, and to the westward so as to open that island a little off the eastern entrance point. When within one mile from St. Andrew's point, open the shipping between it and Crab island. Having arrived abreast and westward of the lightboat, the eastern shore must be kept, and on approaching the south extreme of Crab island the steeples of the two churches at New Amsterdam must be brought to touch each other, to avoid some shoal ground extending from the SE. extreme of the island

After passing Canje river the course must be shaped for the anchorage (pointed out by the shipping), and a convenient berth will be found with the northernmost church in line with the courthouse, and Crab island bearing about north. Vessels drawing 12 feet generally lie aground here at low water.

Tides.—It is high water, full and change, at the entrance to Berbice river at 4h. 30m.; springs rise 8 to 10 feet, and neaps 5 to 6 feet. The flood stream sets to SW., the ebb to north.

Devils creek.—At about 10 miles eastward of Berbice river is Devils creek, the entrance to which may be recognized by a deep gap in the woods. A few houses are scattered along the shore, and their numbers increase as Berbice river is approached; they have, generally, red roofs. An extensive sandbank extends NE. from the creek, and sometimes breaks. Eastward of it a mud flat, with depths of 2 fathoms and less, fronts the shore to the distance of 5 miles, and dries in places near the shore at low water springs.

DUTCH GUIANA.

Dutch Guiana lies between British and French Guiana, being separated from the former on the west by Corentyn river, and from the latter on the east by Maroni river. It presents a sea face about 180 miles in length, without any elevated spot of consequence throughout its whole extent. Its southern limits are but imperfectly known, but the supposed area is about 46,000 square miles.

The population of the colony, including negroes and Indians, is about 60,000.

The trade of this colony is principally with Holland. The chief productions are sugar, rum, molasses, cocoa, and cotton; of recent years gold has also been discovered.

Corentyn river.—This river, dividing British from Dutch Guiana, is only navigable for vessels under 9 or 10 feet draft, which may proceed up 40 miles to the post of Oreala; large canoes ascend to the lower rapids, about 150 miles from the sea. The entrance, between Marys Hope (the northernmost British plantation on the western shore) and Gordon point, is about 15 miles wide, but it is dangerous to approach on account of two hard sandbanks lying in front of it.

Gordon point will be easily recognized by some straggling trees upon it which are loftier than those in the vicinity, and visible from a distance of 12 or 13 miles; it has also some buildings on it. From this the shore trends SW. by W. 7 miles to the entrance of Nickerie river, and then SW. for 4 miles to Bluff point, when it turns abruptly to the southward, and here the mouth of the river is 4 miles wide. Abreast Bluff point the western shore commences to trend a little to the westward of north, sweeping gradually around to NW. and west toward Berbice river, and is so low that the tops of the trees are only just seen when in a depth of 5 fathoms of water.

Bar.—The shoaler part of the bar or mud flat fronting the Corentyn is from 6 to 10 miles northward of Bluff point, with a depth of 7 feet at low water springs, but low water depths of 2 fathoms extend some 2 or 3 miles beyond it. Within Bluff point there are low water depths of 2½ to 3 fathoms.

Cameron bank, obstructing the fairway, is dry at half tide, and from it a flat, with less than 6 feet of water, extends some 6 miles seaward, with a channel on either side of it. From Creek island, near the western shore, abreast Cameron bank, is Lee bank, dry at half ebb, extending about 3 miles northward along the shore, with depths of less than 6 feet for 1½ miles beyond.

About 3 miles southward of Bluff point is situated an island, 7½ miles long north and south and about a mile broad, lying close to the eastern bank, and known as Parrot island, or, more generally, First island. A spit of 3 to 5 feet water extends from its north point. The channel between this island and the right bank of the river is 600 yards wide and carries 9 feet water.

Southward of First island, off the opposite shore, abreast the Molesono river, there is another island named Second island.

Directions for Corentyn river.—In entering Corentyn river the eastern shore should be approached gradually by the lead and Gordon point passed at the distance of about 4 miles in 10 to 12 feet at low water, thence steering for the outer buoy of the Nickerie River approach, thence to No. 3 buoy, situated about 2 miles northwestward of the Nickerie entrance, thence shape course to pass within ½ mile of Bluff point, between it and Cameron bank. In standing over from Bluff point to the anchorage on the western shore, attention must be paid to the tidal stream so as to avoid Cameron bank. Vessels seldom ascend the river higher than Skeldon, the southernmost plantation, which is nearly abreast the north extreme of First island.

The western channel may be taken at half flood by a vessel not drawing more than 9 feet. In this case she should run across the entrance with Marys Hope plantation, bearing about S. 78° W., (S. 79° W. mag.), until the cotton tree bears S. 10° W., (S. 11° W. mag.), which must then be steered for about midway between Cameron and Lee banks, giving Creek island a berth of 200 yards or more; thence to the anchorage of the plantation. The chart should be used with considerable caution, and strangers should employ a pilot.

The produce of the British estates on Corentyn river is carried round in droghers for shipment at Berbice.

Tides.—It is high water, full and change, at the entrance of Corentyn river at 5h. 10m.; springs rise 8½ feet, neaps 5½ feet. The flood stream sets SSW. and the ebb runs out NNE., and in the rainy season the latter attains a velocity of from 3 to 3½ knots an hour to a distance of 10 or 12 miles. The edge of the stream is distinctly marked by discolored water. In the Corentyn, at 70 miles from the sea, the tide rises 2½ feet.

Nickerie river.—This small stream, which enters the sea about 7 miles southwestward of Gordon point, is about 200 yards wide, with low water depths of from 9 to 15 feet abreast the settlement of New Rotterdam on the east side of the entrance. The river is fronted by a mud flat to the distance of a mile off shore, with a depth of about 6 feet at low water over the deepest portion of it in 1892. Its depth and direction are subject to frequent alteration.

Light.—A beacon, from which a fixed white light is exhibited when the mail steamer is expected, is erected on the eastern side of the channel at about 600 yards northward of the landing place.

Buoys and beacons.—Four black can buoys mark the best water in approach. The outer one lies nearly north about 3¼ miles from the entrance. A beacon is erected on the bar 800 yards southwestward of No. 1, thinner buoy (the channel is between them), and another abreast the west point of entrance.

Directions.—As the mud flats extend about 8 miles northward of the Nickerie, with low water depths of 12 feet, this river is only available for lightdraft vessels, which should pass close westward of all the buoys and of the lightbeacon, anchoring abreast the settlement in about 12 feet, or proceed farther up.

In running in, strict attention must be paid to the lead, and, on opening the mouth of the river, the flood stream will be found to set strongly toward the lee banks.

New Rotterdam.—The customhouse is near this town, but vessels usually load and discharge at the plantation higher up the river.

Supplies.—Provisions are very expensive, and there are butfew articles obtainable. The water of the river is brackish, and in the dry season the supply in the cisterns is very small.

Coast.—The coast from Gordon point to Coppename river, a distance of about 60 miles, trends easterly, and is sandy and slightly wooded. There are several small creeks and posts or plantations in this space, and the Coppename bank extends about 5 miles off shore, between Coppename river and Coronie, with depths of not above 3 fathoms, soft mud, at 10 miles off shore.

Burnside, a sugar plantation, is about 35 miles eastward of Gordon point, and may be known by a conspicuous tall chimney.

Coronie, about 4 miles eastward of Burnside, may be known by the houses on the shore and a flagstaff with the Dutch flag; in its vicinity are several sugar and cotton plantations, the buildings of which are visible from seaward.

Potosie and Turtle banks.—At about 30 miles eastward of Gordon point is Potosie bank, which extends from the shore about 8 miles, steep-to on the east side. With a fresh breeze there is a heavy rolling sea, by which the extent of the bank is seen. This bank is considered the most dangerous on the coast, and is much in the way of vessels working to windward. When Burnside chimney bears S. 12° E. (S. 11° E. mag.) a vessel will be to the eastward of the bank.

Between Gordon point and this shoal there is another bank of sand and shell, named the Turtle, which extends about 2 miles from the shore, with its apex 4 miles eastward of Gordon point. Depths of 2 fathoms only will be found at 5 miles off shore abreast it.

Coppename and Saramacca rivers.—The entrance to these rivers is about 7 miles wide, but is so obstructed by shoals as to be only navigable for vessels drawing about 12 feet. The bars of these rivers have a depth of 8 feet at low water springs, and from 15 to 16 feet at high water neaps (1892).

The channel to Coppename river is bounded on the westward by a mud bank, and on the eastward by Coppename shoal, which extends from the east point of entrance as far as the entrance to the Saramacca. The least water at the entrance is 8 feet at low water, which increases to 3 and 10 fathoms within the river, but the navigation is interrupted by banks having the same depth as the bar. Vessels when entering should keep about one-third of the width of the river from its western shore. In clear weather the white church of Batavia settlement will come in sight shortly after entering the river.

A bank, with only 7 or 8 feet water on it, stretches off from Batavia, to avoid which vessels must keep near the eastern shore in 3 or 4 fathoms water.

About 44 miles from the entrance is a small island named Bonnie, where the channel has from 6½ to 7 fathoms in it; at 4 miles above this the river becomes shallow, but it is said to be navigable for vessels which can cross the bar to latitude 5° 10 N., about 90 miles from its mouth.

The Coppename is one of the principal rivers of Dutch Guiana. The woods extend to its banks and become thicker and higher the farther the river is ascended; its banks appear to be steep-to, and a vessel's rigging may easily become foul of the trees. Many small rivers or creeks run into Coppename river, and the Kusewine (Coesewine), just within its entrance on the east bank, is about ½ mile at its mouth, with 2½ and 3 fathoms of water, carrying depths within of 4 and 5 fathoms for several miles, and is sufficiently wide to allow a moderate sized steamer to turn. This stream is not impeded by shoals, and its banks are steep-to; it may be ascended by small steamers, drawing 5 feet, for about 80 miles.

The Saramacca at its entrance runs nearly east and west, and for 4 miles it carries 8 feet at low water, but farther up the river deepens to 6 fathoms. The river is about 150 miles long, without allowing for windings, and is navigable for vessels which can cross the bar to latitude 5° 30′ N., about 100 miles. The settlements of Nassau and Brook are on the south bank at about 3 and 9 miles, respectively, above the entrance.

Tides.—At the entrance of Coppename river the tides are regular; it is high water, full and change about 5 hrs.; springs rise 10 feet, and neaps 7 to 8 feet; but higher up the river they are affected by the rains.

Caution.—The shoal water fringing the shore between Coppename and Surinam rivers is reported to extend much further to the northward than was formerly supposed.

Coast.—From Barbara point the shore trends easterly for about 45 miles to the Surinam river. It is low and sandy and backed by mangroves and trees, which are remarkably green, and visible from the offing, when on soundings of from 9 to 10 fathoms. At 10 miles to the eastward of Barbara point a conspicuous clump of trees, named the Bears rump, forms a good mark; and 10 miles farther eastward there is a remarkable break in the woods, known as the Gap. From Braams point to Maroni river, a distance of about 80 miles, the coast is nearly straight and takes a general ESE. direction. Mud flats front this coast, dry at low water, to the distance of from 2 to 3 miles in places. It may be navigated without fear, provided attention is paid to the lead.

Surinam river.—This river, the principal stream in Dutch Guiana, is navigable at high water neaps for vessels drawing 16 feet, to Paramaribo, the chief town and seat of government (situated on the left bank about 12 miles from the entrance), and for small vessels to a considerable distance farther up. The mouth, which is about 2 miles wide, opens out to the westward, and the channel through it is bounded on the eastern side by a firm mud bank, with depths of 10 to 15 feet, extending NNW. from Braams point, and to the westward by a soft mud bank, which also extends far out to sea; the south shore is not seen until a vessel is within the outer banks. There is said to be a bank with only 11 feet water at one mile northward of the lightvessel.

About 3 miles within Braams point, on the eastern shore, is Resolutie plantation, abreast of which, and extending across the river, is the lower bar of Resolutie shallow, with 10 to 11 feet on it. The river is again barred abreast of Jachtlust, 10 miles above the entrance, the depth being 10 or 11 feet at low water.

At fort New Amsterdam, on the south entrance point of Commewine river, Surinam river forms a bend to the south and SW. to the city of Paramaribo. Above the fort, between the upper and lower bars, the river considerably deepens, and vessels of heavy burden generally drop down here to complete their cargoes. Abreast Voorburg plantation, at ¾ mile south of fort New Amsterdam, is a spot known as Tigers hole, which has from 5 to 6 fathoms water. Off Paramaribo there is anchorage in from 3 to 5½ fathoms, with similar depths near the quays.

Caution.—The depths in the river are liable to alterations and the buoys are not to be depended on. The discolored water from the Surinam is seen when at a considerable distance in the offing.

Commewine river.—Numerous small rivers and creeks flow into the Surinam; the principal is the Commewine river, which enters it from the eastward about 5 miles above Braams point.

The Commewine is about one mile wide at the mouth, with a low water depth of 9 feet. The settlement of Sommelsdyk is about 15 miles up the river, to which, probably, light draft steamers can ascend. The banks of the river are highly cultivated. A sandbank with less than 6 feet of water extends for ¼ mile from fort New Amsterdam, the south point of entrance.

Light.—At the entrance of Surinam river a lightvessel is moored in 14 feet, at low water springs, from which is exhibited a light at an elevation of 25 feet above the sea, which may be seen in clear weather from a distance of 8 miles. The vessel has two masts, is painted *red*, and has on each side in *white letters* the name *Surinam*. A *black ball* is placed at the foremasthead and a blue flag at the main. From the vessel Braams point bears S. 34° E. (S. 32° E. mag.), distant 5 miles. The position ot this lightvessel is not to be depended upon.

Buoys.—The entrance to the river between the lightvessel and Braams point is marked by three buoys; the outermost, conical, is about one mile within the lightvessel. The position of these buoys is subject to alteration and is not given. The channel is to the westward of them. Two white buoys, ¾ mile apart, mark the telegraph cable southward of Braams point; the northern one is ½ mile southward of the point. Two white beacons on the south shore, in line, also mark it. The fairway is between the buoys.

A black can buoy in 9 feet marks the NW. extreme of the bank, extending from fort New Amsterdam.

Pilots.—Licensed pilots are stationed on board the lightvessel. The Netherlands Government has given instructions that on the arrival of a vessel of war of any nationality at the entrance of Surinam river the captain or mate of the lightvessel shall do duty as pilot if required.

Anchorage.—With Braams point bearing about east there is a pit, or hole, known as the Pool, having 15 to 17 feet water in it, which affords good anchorage for vessels waiting for wind or tide. In every part of this river the anchor sinks deep into the mud, and if a protracted stay is made it will be well to weigh the anchor from time to time.

There is anchorage between the bars, above fort New Amsterdam, in from 3 to 4½ fathoms, but vessels are prohibited from anchoring within 100 yards of the telephone cable laid in the river a little above the fort. Notice boards marked *Niet ankern*, and finger posts, on either side of the river mark the position. Anchorage is also prohibited southward of Braams point, near the line of the telegraph cable.

The anchorage abreast of Paramaribo is known as Paramaribo roads; it is not advisable to anchor close to fort Zeelandia as the current runs strongly.

Tides.—It is high water, full and change, at the lightvessel off Surinam river at 5h. 0m.; at Braams point at 5h. 30m.; off fort New Amsterdam at 6h. 0m., and at Paramaribo at 6h. 0m. Springs rise 9 to 10 feet, neaps 5 to 6 feet. The water falls 1½ or 2 feet before commencement of the ebb stream in mid-channel. In the offing, the flood stream sets to the westward, the ebb to the eastward. The influence of the tides is felt at above 60 miles from the mouth of the river, and the water becomes fresh at about 25 or 30 miles up.

Directions for Surinam river.—Sailing vessels bound to Surinam river, from Europe, should endeavor to cross the parallel of latitude 5° N. on about the meridian of longitude 50° W., unless they have good chronometers, when they may venture to cross that meridian a degree farther to the northward; bearing in mind, however, that in the rainy season more particularly, astronomical observations are interrupted by long intervals of cloudy weather.

The object should be to obtain soundings, and, if possible, make the land in the neighborhood of Cayenne, where it is so remarkable. If soundings are obtained in 60 fathoms, fine sand and mud, in about latitude 5° 55′ N., it is a certain indication of being to the northeastward of that place. Should a vessel have been swept by the current to the northward of latitude 6° N. without sighting the highlands to the eastward of Maroni river, she will find 30 to 45 fathoms, soft mud, with fine sand and broken shell, at 60 to 90 miles north and NE. of that river.

In approaching the shore about Mana point, eastward of the Maroni, great care must be taken not to come within the depth of 10 fathoms, where the ground will be coarse. This will avoid the Maroni shoals, which extend to the northward 8 miles from the shore, where the depth is only 2 fathoms, and 20 miles to the NW., where it is only 3 fathoms. At 30 miles NE. of the Maroni there are 15 fathoms, and here the current generally runs to the NW. at the rate of 2 to 3 knots an hour. To the westward of Maroni river the bottom is soft sand and mud, which is a good guide.

The land should by all means be made about Post Orange (Vredenburg), about 35 miles eastward of Surinam, to insure being to windward of Braams point, for should it be missed there will be great difficulty in getting to windward again. This remark applies also to vessels bound to Surinam from the northward, or the Antilles.

Having sighted Vredenburg, a vessel may safely run along shore by the lead, taking care when off Branchwacht to haul out to avoid the bank lying NW. of it, keeping in not less than 4 fathoms; from Surinam lightvessel steer for the outer buoy, remembering that if the vessel is of more than 11 feet draft she must await the flood tide. The reported bank of 11 feet about one mile northward of the lightvessel should be looked out for and the lead kept carefully going.

The Crab wood is a good landmark for identifying the entrance. Having rounded the lightvessel, the channel is westward of the buoys, passing ½ mile or more off Braams point to avoid the hard spit extending from it. Thence in mid-channel across Resolutie shallows in 16 feet at high water neaps, and guarding against the indraught on the flood into the Commewine river. Keep the eastern side of the river above fort New Amsterdam as far as Paramaribo, to avoid American bank. The inner bar, with the same depth of water as the outer, is abreast Jachtlust signal post. Moderate draft vessels sometimes load and discharge in the anchorage below this bar.

A vessel should not attempt to pass the outer buoy without the certainty of being able to gain an anchorage within before dark, for getting aground here is often attended with fatal consequences, although a vessel may sail over the soft flats in a little more water than she draws. Should it be necessary to wait for the wind or tide, instead of heaving to it will be better to anchor outside in 3½ or 4 fathoms, to prevent being swept to leeward by the current.

Upper river.—Above Paramaribo the river is clear, the deepest water being in the middle, and decreasing regularly towards the sides.

The first mud bank above the town is just south of Ric à Rac plantation off Gœde Vrede plantation; it is steep-to, and the channel southward of it has 6 fathoms water. Above Toledo plantation the river is not navigable on account of the numerous sand banks.

Boats can only ascend to Soden Savannah at high water.

Rollers.—Heavy rollers are experienced in December, January, and February.

Paramaribo is situated on the western bank of the Surinam, about 12 miles above the entrance. The city, built in 1652, has a deep water frontage of about one mile, with fort Zeelandia at its western extreme. A small portion of this frontage is wharfed and there are several quays and warehouses. The sanitary condition of the city is reported good. Paramaribo presents a pleasing appearance from the roadstead; the houses are mostly built of wood, painted white, and surrounded by gardens; the streets are wide and there are many conspicuous brick public buildings. It has several churches, an exchange, and is the center of trade of the colony. Fort Zeelandia is the residence of the Governor-general and the seat of most of the government establishments. Population about 30,000, and the United States is represented by a vice-consul.

Wharves.—The Netherlands West India Mail Company berth the mail steamers alongside of their own wharf, in a depth of 18 feet at low water. The colonial government pier, customhouse pier, and a private pier have each depths of 16 feet at their east ends and 12 feet at their west ends at low water springs. There is no dock accommodation.

Time ball.—A disk, painted black and white, is dropped from the main yard of the guard ship at Paramaribo at noon, local mean time, corresponding to 3h. 40m. 39.7s., G. M. T. The disk is hoisted halfway up at five minutes before noon, and all the way up at three minutes before.

Port charges.—Tonnage dues are 20 cents a ton, including loading and discharging; harbor master's fee, $3.20; beacon fees, $4; doctor's fees at fort New Amsterdam, $1.20; police fees, 40 cents; clearance, $1.

Pilotage.—The pilotage is $6 for vessels drawing 10 feet or less, and $2 extra for each foot above 10. Docking a vessel is $2 extra.

Supplies.—Provisions of all kinds are expensive. Vessels of war may obtain water from a well in the vicinity of the landing place, and merchant vessels from wells in the town, but sometimes they are obliged to obtain it from the Soden Savannah, as the inhabitants depend upon rain water caught in cisterns.

Coal.—A supply of Cardiff coal, sufficient for the use of the government and mail company's steamers only, is kept here. These vessels coal alongside the wharves.

Repairs.—There is a government machine shop for repairs to steamers.

Signals.—Signal stations are established at fort New Amsterdam, Jachtlust, and fort Zeelandia.

Hospital.—Sailors are admitted to the military hospital by the order of their consuls at a very nominal charge per day.

Quarantine station.—The station is at Post Leiden, north entrance point of the Commewine. Vessels must stop here for inspection. The medical officer boards vessels abreast fort New Amsterdam. Common tropical fever is prevalent from July to December.

Communication.—The Royal Dutch mail leaves Amsterdam every three weeks direct for Surinam; thence via Demerara to the principal Venezuelan ports, Curaçao, Haiti, and New York. A French line of steamers calls monthly en route to Martinique from Cayenne. The colony is in the Postal Union. Cable to Martinique and thence to all ports. Communication by small steamer with Demerara every two weeks.

Caution.—Bathing is dangerous in Surinam river, from the force of the stream and the attacks of sawfish. Instances have been known of soldiers, whilst washing their clothes on the banks of the river, losing their legs from these attacks. Care should also be taken to prevent water serpents getting on board by the cables, as a bite from one of these reptiles may cause death in two or three days. Boats should be kept in water as little as possible.

Braams point.—This point, which forms the east side of the entrance to Surinam river, is very low and lies 5 miles to the southward of False Braams point.

Crab wood.—Where the coast begins to trend to the SE., on the edge of the wood there is a row of trees without leaves, of a singular brown burnt appearance, which have existed for many years, and is known as the Crab wood. These burnt trees are a good landmark before making Braams point; they lie about 8 miles eastward of it, and are rather extensive. The land at the entrance to Surinam river will not be seen when outside the depth of 4 fathoms.

Warappa creek lies about 15 miles eastward of Braams point, and the settlement of Ethelrust is near its west bank; at this spot the coast is everywhere cultivated, and many of the trees standing by themselves present the appearance of vessels sailing before the wind.

At about 16 or 18 miles eastward of Surinam lightvessel there are two remarkable palm trees which resemble large flags on poles.

Metappica creek is 3 or 4 miles to the eastward of Warappa creek and is not visible from seaward. There are here, however, a considerable number of buildings which can be seen when the atmosphere is clear.

Branchwacht, or Mot creek, about 10 miles to the eastward, is a small village at the entrance of the creek. It is shown by a small break in the trees that border the shore. Between Branchwacht and Post Orange the shore is sandy, and backed by swamps and extensive lagoons.

Caution.—When off the opening to Mot creek a vessel running along the coast should haul out to NW., keeping in not less than 4 fathoms water to avoid the east side of an extensive mud flat, which extends some 10 miles off the entrance to the Surinam river. This shoal commences about 4 miles eastward of Mot creek, and extends from the coast 8 or 10 miles.

Post Orange, or Vredenburg.—The next object seen on proceeding eastward is a little village, or post, situated on the shore about 35 miles westward of Galibi point, the western entrance point to the Maroni. It lies almost hidden in the wood, and is known by a small fort, on which the Dutch flag is generally hoisted when a vessel is seen passing; this fort is better seen than the two or three white barracks in the vicinity. Some authorities state that high land may be seen far in the interior, between Maroni and this place.

Wia Wia and Kweriman banks fringe the coast between Maroni river and Post Orange. The Wia Wia dries about 3½ miles off and the Kweriman about one mile off, with a not greater depth than 2 fathoms at 2 miles outside them.

FRENCH GUIANA.

French Guiana.—The smallest and most eastern of the three colonies is about 250 miles in length, north and south, 100 to 150 miles in breadth, and has an area of 27,560 square miles. Its coast line extends from Maroni river to the Oyapok, a seaboard of about 170 miles in length, and the low alluvial tract along the coast is of great fertility. The mountain chains are wholly of granite, and extend east and west, but do not attain a great elevation.

The trade of French Guiana is chiefly with France and its colonies. Besides the staples of British and Dutch Guiana, its productions comprise pepper, cloves, cinnamon, and nutmegs.

The population is estimated at 10,600 in Cayenne, and about 15,000 in the interior, in addition to a few mountain tribes. Population of the penitentiaries and the liberated convicts about 4,000.

Maroni river, which forms the western boundary of French Guiana, enters the sea at about 8 miles westward of the Mana; the entrance between Galibi point and Les Hattes (Francaise point), is about 2½ miles wide, and open to the NNE. On Galibi point there is a Dutch post and lighthouse. Les Hattes, the east entrance point, is surrounded by a clump of trees, and has a lighthouse on it. From the west entrance point the shore takes a northwesterly direction for about 5 miles, and then at Gros Bois point resumes its westerly course; this part of the coast is more elevated, and on Gros Bois point are two conspicuous hummocks, which are guides to the entrance of the river.

From Française point a mud flat (known as the French banks) extends 4 miles, and from Galibi point a sandbank, known as Dutch or Tiger banks, extend to the northward about 5 miles, breaking at half tide. Between the two banks there is a bar about one mile across, with about 8 feet in the navigable channel over it at low water springs and 17 feet at high water springs (1887). Within the bar the channel is one mile wide, with a low water depth into the river of from 3 to 4 fathoms. Large canoes can ascend the river as far as Armina, which is a little below the first rapids. The distance is not known.

Light.—From a white pyramid-shaped structure on Les Hattes point a fixed white light is shown, elevated 75 feet and visible in clear weather from a distance of 10 miles, between the bearings of N. 79° E. (N. 81° E. mag.) through south to S. 79° W. (S. 81° W. mag.).

Buoyage.—The entrance to the Maroni is marked by a white outer buoy in the fairway, about 6½ miles N. 15° E. (N. 17° E. mag.) from Les Hattes light; by three black buoys on the starboard hand and three red buoys on the port hand. Between the outer pair of buoys is the best water over the bar. The buoys on either side within the bar mark the sides of the channel and the edges of the Dutch or Tiger banks and French banks. No dependence can be placed on them.

Tides.—It is high water, full and change, at the entrance of Maroni river at 5h. 0m.; springs rise 9 feet and neaps 6 feet.

The flood stream off the entrance to Maroni river sets first to NW., then west, and finally south.

The ebb stream has a tendency to set toward the Dutch banks.

Directions.—The two bluff points at the entrance may be seen from a distance of 13 or 14 miles when in a depth of about 5 fathoms. It is remarkable that in the vicinity of this river the bottom is composed of red sand, which is a good guide when approaching at night, the bottom off other parts of the coast for a distance of 30 miles being of mud.

Vessels bound to Maroni river from the eastward should not shoal the water less than 6 or 7 fathoms, until Galibi point bears S. 37° W. (S. 39° W. mag.), when steer for it on this bearing, leaving the white fairway buoy upon the starboard hand; thence about S. 32° W. (S. 34° W. mag.), passing between the bar buoys; thence in mid-channel between the others. When Galibi Point light structure bears S. 77° W. (S. 79° W. mag.), distant one mile, steer for a white triangle placed in a conspicuous tree on Panato point bearing S. 2° E. (south mag.). This is said to be the lead between the inner portion of French banks and the shallow banks within Galibi point. Panato point is steep to, with depths of from 4 to 5 fathoms.

To proceed above this to the settlements the service of a pilot is required, and it is not recommended to proceed thus far without one, if not locally acquainted. Light draft vessels can ascend the river (1883) to Sparonine. The distance is not known.

Mana river is about 7 miles eastward of the Maroni. The Mana will only admit small coasting vessels at high water, the mouth being obstructed by a mud flat, extending NW. 8 miles and NE. 10 miles from the entrance. In 1883 the river had a depth of 4½ feet at low water in its entrance; springs rise about 9 feet. Small craft navigate to the town of Mana, 6 miles above the entrance, one of the most important in French Guiana. Vessels moor abreast the town in 3½ fathoms.

Acarouani river.—This deep river enters the Mana river from the westward 6½ miles from its mouth and ½ mile above the town of Mana. The Acarouani is navigable for small vessels for a distance of 8 miles.

Directions.—Steer for a conspicuous umbrella tree, about 2 miles westward of the Mana entrance, when bearing S. 21° W. (S. 23° W.) until the river is well open; thence in mid-channel until abreast the entrance points; then keep the eastern side to avoid Parasol bank. A pilot is necessary.

Organabo and Iracoubo rivers.—The entrance of the Organabo is about 28 miles ESE. of the Mana. High land begins to rise from the interior about 10 miles westward of the entrance and terminates near the entrance of the Mana. The mouth of the Organabo (marked by a group of green islets) is difficult to find until close to it, and is so narrow and shallow as to be fit for small coasters only. From the Organabo the coast continues in the same direction for 13 miles to the Iracoubo, and is a low shore, scantily covered here and there with clumps of brushwood. The interior is generally overflowed and forms extensive lagoons. The Iracoubo will only admit small vessels and the entrance is difficult to recognize.

Iracoubo flat.—From within 6 miles of the Organabo river to the Bourgeois rocks, Iracoubo flat fronts the coast to the distance of 10 miles, at which distance there is a depth of about 5 fathoms.

Bourgeois rocks.—From Iracoubo river the shore trends ESE. for 7 miles to the Counamana. About midway between these rivers, and but a short distance from the coast, lies a small ledge of rocks, above water, named Bourgeois, which are the last that will be met with when proceeding to the westward.

Caution.—In navigating this part of the coast care should be taken not to come within the depth of 4 fathoms, to avoid the ledges lying between Iracoubo river and Cayenne. These are the only known dangers to be guarded against, and it is to be observed that whenever the shore is bounded by mangroves the bottom in front is muddy and deeper and bolder than elsewhere.

Counamana river.—The entrance to this river is difficult to find and is only available for small coasting vessels. Near its mouth there are some huts, and westward of the river there is a remarkable ridge of irregular conical hills, named the Iracoubo mountains, which extend in a WNW. direction about 12 miles, being the last elevated land that will be seen eastward of Maroni river.

Corosoni rocks.—To the westward of the Sinnamari the shore is low and sandy and for 5 miles is skirted by a ledge of rocks (known as the Corosoni, or Toulonaise) extending about a mile from the shore, with shallow ground a long distance seaward of them.

Sinnamari river is about 12 miles eastward of the Counamana. On the eastern side of the river the trees form a grove higher than those adjacent. A mud flat extends off 6 miles, which prevents an approach sufficiently near to make out the entrance; but a good guide will be mount Corosoni, bearing S. 48° W. (S. 51° W. mag.). The river is frequented by small coasters; the mouth is 430 yards wide. The bar is nearly dry at low water, but has a depth of 10 feet, hard sand, at high water springs.

Directions.—The mark for the bar is Severs palms seen through the entrance between Joubert and Mangrove points, bearing about S. 17° E. (S. 14° E. mag.); this leads in about 10 feet high water springs (1883). Within the bar, and as far as Sinnamari, about 2½ miles above the entrance, there are low water depths of from 1½ to 4 fathoms, the latter depths being off the town.

Severs rocks on the eastern side are marked by a beacon; when nearing Pascal rocks on the western shore keep close over to the mangroves on the eastern side, thence in mid-channel. Vessels moor off the town in about 3 fathoms, sandy bottom, elsewhere the bottom is rock. The river is probably impracticable during the bad months, from about December to April, when the wind is more on shore, on account of the breakers.

A pilot is necessary.

Telegraph.—Sinnamari is in telegraphic communication with Cayenne.

Coast.—The coast from the Sinnamari to Charlotte point, a distance of about 20 miles, takes a general SE. by E. direction, the shore being low and sandy. Here and there will be seen a few habitations and small clumps of trees, and the whole line of coast is closely fringed with detached rocks, which become more numerous in the vicinity of Verte isle.

On this extent of coast the eastern entrance point of Sinnamari river is marked by a clump of mangroves which rises higher than those in the vicinity.

Caution.—The Salut, Remire, and Connétable islands and the offlying shoals are the only outlying points on the whole of this coast that could endanger a vessel should she touch them; it is therefore imperative to be cautious against the current when passing. The passage between the Connétable islets should not be attempted without a leading wind; it is much better to pass outside them at a sufficient distance to give a wide berth to the Battures and Cospatrick shoals.

Verte isle.—This small islet lies about 1½ miles from the shore, at 17 miles westward of the Salut isles.

It is very low and partially covered with dwarf shrubs, so that it is difficult to make out. There is a channel between Verte isle and the main for small vessels, but it is said to be filling up.

Malmanuri flats.—At about 10 miles westward of the Salut isles there is a chain of rocks at 2 miles from the shore known as the flats of Malmanuri. It is 2 miles in extent from east to west and one mile from north to south; the edges are of hard mud, and the breakers over it may be seen from a distance of 2 or 3 miles. The mud flats extend some 7 miles off shore, and the sea is heavier here than on any other part of the coast.

Mont Diable.—Southwest of Malmanuri flats, and at about 9 miles inland, there is a very remarkable conical hill named mont Diable, which may, in clear weather, be seen a distance of 20 miles. Mont Corosini, a lower mountain, lies 10 miles northwestward of it.

Salut isles.—This group of three small rocky islets, known as Diable, Royale, and St. Joseph islets, occupying a space of about a mile in each direction, lies northeastward, distant 7 miles from Charlotte point and N. 37° W. (N. 34° W. mag.), distant 25 miles from Cayenne. Diable islet is 95 feet above the sea; Royale, the central islet, is 197 feet high; St. Joseph, the southern islet, is 121 feet high. They are inhabited, and upon them are extensive Government buildings.

The Salut islets are used by the French as a penal settlement. On Royale, the principal islet, are the convict barracks with about 700 convicts, a military hospital, and quarters for the officials.

Some of the lesser criminals are kept on St. Joseph and a few lepers on Diable islet.

Climate.—The islands are unhealthy, more especially during the rainy season from December to April, which causes great mortality from dysentery among the convicts. On account of this sickness the anchorage under the lee at that season is not a desirable one, and should be avoided.

Lights.—A lighthouse stands on the summit of the hospital on Royale islet, from which is exhibited, at an elevation of 197 feet above sea, a fixed white light which in clear weather should be visible from a distance of 13 miles. It is obscured to the southeastward by trees on St. Joseph islet.

A small fixed light is hoisted every night on a wooden pier near the aqueduct, at the SW. point of St. Joseph islet.

Anchorages.—Anchorage in 3¾ fathoms, muddy bottom, will be found at about ½ mile from the west side of the northernmost islet, sheltered from the prevailing east winds; and in the bight formed between St.

Joseph and Royale islets there is still better shelter, especially for vessels of light draft, in 3 fathoms. These are the best, and indeed the only safe, anchorages on this coast outside the rivers.

Caution.—The passage between Royale and St. Joseph islets is not used on account of the strong westerly current. A 2-fathom patch lies nearly in mid-channel in the eastern approach.

Directions.—Approaching from the northwestward, bring the west extreme of Royale islet to bear westward of S. 31° W. (S. 34° W. mag.) before hauling in to avoid Amazon shoals; or give the islands a berth of ¼ mile. From the eastward there are no dangers excepting the spit, which extends 200 yards from the south extreme of St. Joseph islet.

Tides.—It is high water, full and change, at Salut isles at 4h. 26m.; springs rise from 6 to 10 feet.

Supplies.—Fresh bread is obtainable, and beef three times a week. Also a small supply of water from St. Joseph islet.

Coal.—About 2,000 tons of patent fuel were stored here in 1889 in the buildings westward of Royale Islet breakwater. There were several small lighters.

Vessels up to about 24 feet draft might possibly coal, as no harm would happen to a vessel touching the bottom, which is soft mud, anchoring as near the coal stores landing place as the draft permits.

Semaphore.—A semaphore stands on Royale islet just eastward of the fort. Vessels are requested not to anchor on an imaginary line joining it to the semaphore at Kuru river (about NNE. and SSW., so as not to obstruct the view) through which signals are transmitted to Cayenne.

Amazon shoals.—In a NW. direction from the center of Diable islet and between the distances of $\frac{7}{10}$ mile and 1½ miles from that island, are numerous shoal heads, having over them depths varying from 1½ to 2¾ fathoms, hard sand.

The nearest of these to Salut islets has over it 1¾ to 2¼ fathoms, and lies N. 14° W. (N. 11° W. mag.) of Royale Islet lighthouse, distant nearly one mile.

The NE. extreme of Diable islet bearing southward of S. 25° E., (S. 22° E. mag.) leads northeastward, and the SW. extreme of Royale islet westward of S. 31° W. (S. 34° W. mag.), leads southeastward of the shoals.

Charlotte point.—At 3 miles NW. of the entrance to Kuru river there is a well-defined point with some rocks at its base known as Charlotte point; between is Kuru bay; a stream of water flows into the sea near this point.

A chain of rocks extends in a northeasterly direction from Charlotte point for nearly a mile; the outer part of these, known as Roches Plattes, or Flat rocks, dry at low water.

Kuru river.—The mouth of Kuru river lies between low points, the eastern of which projects a little distance beyond the other. It is narrow, but deep enough for vessels of moderate draft, and has the advantage of good anchorage in the immediate vicinity for large vessels. In 1879 the depth over the bar was 13 feet. The river is impracticable during the winter months on account of the breakers.

The western shore of Kuru river is rocky, and does not change; the eastern side is formed by a mangrove swamp, terminating in Raybois point, which frequently alters in form.

Close to the shore on the east side of Kuru river is mont Guatemala; at a short distance farther inland to the southwestward lies mont Condamine, 560 feet high; and on the west side is situated mont Pariacabo. These are all remarkable objects when seen from a long distance, and afford good guides for the entrance of the river.

Semaphore.—There is a semaphore station at the Kuru river for communicating with the Salut isles.

Kuru rocks.—These two dangerous rocks (marked by small beacons) lie in the entrance of Kuru river, at about ½ mile off shore. The eastern of these, La Folle, uncovers at low water, the western (Vitalo rock) has one foot over it; these rocks are directly in the way of vessels visiting the Kuru. The beacons are not to be depended on.

Garadier rocks.—These rocks lie eastward, distant 4½ miles from the entrance of Kuru river, and 2½ miles from the shore; they generally uncover 3 feet at low water springs, but are seldom visible at ordinary tides. Lying immediately in the route of small vessels passing to and fro from Cayenne, they are, of course, very dangerous.

The position of these rocks is indicated by breakers, except during calms. About midway between Garadier rocks and the shore is a group of three rocks above water known as the Bonnet rocks.

Coast.—The coast from Kuru river to the Cayenne river trends SE. for a distance of 21 miles, and is known as the coast of Macouria. Between the Kuru and Macouria rivers the shore is bounded by mangroves, somewhat more elevated than elsewhere. Macouria river is small, and the mouth so narrow that it is not easily found until close upon it. From Macouria river to the point of that name, 11 miles distant, the shore is low and sandy; but about midway and not far inland is mont Macouria, 360 feet high, which at a certain distance appears like an island.

Island and River of Cayenne.—The island of Cayenne is bounded on the west by the Cayenne, on the east by the Mahuri river, and on the south by a natural canal which unites these two streams. Being mountainous (the summit, mont Maturi, being 837 feet high), it presents totally different features from any other part of the coast of Guiana. The NW. extreme terminates at a low point, on which is situated the town of Cayenne, at the eastern side of the entrance of the river. The NE. shore, which is fringed with offlying rocks, is formed of sandy bays separated by bold rocky heights, which slope towards the south and west.

Mont Bourda, 482 feet high, and surmounted by a semaphore, is close to the shore on the NE. side of the island.

A cutting has been made in the summit of this hill in an east and west direction, which can be seen from Le Grand Connétable islet, and forms a good mark for vessels approaching from the eastward.

Depths.—In 1886, a bar 300 yards across, with a depth of 3 feet had formed across Cayenne river, between Macouria point and Aimable rock; this would afford a depth of about 10 feet only at high water springs. In 1892, vessels of 15 feet draft were, at times, able to enter.

Within the point on which the town is built the channel deepens; here small vessels moor near the pier which is T-shaped and alongside of which they can lie at high water. There is probably not more than 10 feet in the river at low water, but it depends altogether on the previous rainy season.

Rocks, beacons, and buoys.—Off the north extreme of the island, at ¾ mile distant, is a cluster of rocks known as Tas de Roches; a dangerous sunken rock, St. Francois lies $\frac{6}{10}$ mile outside of them, and within them are the Dupont islets; at about one mile west of these latter are English rocks.

Four rocks, known as the Major, Aimable, Maillard, and Cheval Blanc (White Horse) rocks, lie on the eastern side of the entrance to Cayenne river at an average distance of about ⅓ mile from the shore.

Major rock uncovers at low water; Aimable rock sometimes covers and is marked by a white buoy. The Maillard has 9 feet water on it and is marked by a white buoy. The Cheval Blanc is usually above water, but sometimes it covers; it is marked by a small white beacon. The western side of the entrance to the river is bounded by a sandbank extending from Macouria point to Aimable rock. The bank is extending eastward. It is intended to adopt the French system of buoyage.

The bank extending from Cayenne river entrance is known as Les Sommes.

Telegraph buoys.—The Submarine Cable Company has moored NNE. of Cayenne two cylindrical buoys marked T. S. M.; the east buoy, painted red, lies (approximately) 5 miles N. 29° E., (N. 32° E. mag.,) from Cayenne lighthouse, and the west buoy at about the same distance N. 15° E., (N. 18° E. mag.,) from the same light.

Lights.—From a wooden framework on Enfant Perdu is exhibited at an elevation of 61 feet above high water a fixed white light, visible 7 miles.

Near fort Céperou is exhibited a *fixed white* light, elevated 130 feet above the sea, which should be visible in clear weather from a distance of 12 miles. Obscured westward of S. 43° N. (S. 46° W. mag.).

A *fixed red* light is shown from the end of jetty at 39 feet above high water, which should be visible in clear weather from a distance of 5 miles. (Temporarily discontinued.)

Pilots.—The pilots for Cayenne river reside on La Mère islet, and on the summit is their flagstaff.

Town.—The town of Cayenne, containing a population of about 10,600, is built on the NW. extreme of Cayenne island; it is the capital of French Guiana and contains several handsome buildings.

The United States is represented by a consul.

Supplies.—Ordinary supplies can be obtained; there are facilities for effecting minor repairs to small craft.

Coal.—There are coal depots for the Government services. From private sources quantities up to about 250 tons are usually to be obtained.

Climate.—Yellow fever occurs at times; the season from April to September, inclusive, is generally very unhealthy.

Semaphores are established on Le Pére islet, mont Bourda, and fort Cépérou. Vessels can communicate by the International Code.

Telegraph.—Cayenne is connected by cable with Pará eastward and Paramaribo westward, and by them with the United States.

Directions for Cayenne.—The rivers of Guiana undergo such frequent changes that it is difficult to give directions that can be depended upon at all periods. The banks of sand and mud are sometimes so extensive as to close their mouths altogether; and although the entrance to the Cayenne may be an exception, it should never be navigated without a pilot.

At all times the land should be made well to the southward of the point of destination, to prevent being carried too far to leeward by the NW. current, which runs at the rate of 2 to 3 knots an hour.

After passing cape Orange, should it not be possible to sight Le Grand Connétable islet before dark, it will be better to anchor, or stand off and on under commanding sail, keeping outside the depth of 10 fathoms.

Vessels drawing less than 10 feet of water can pass inside the Connétable islets, and run along the land in from 3 to 4 fathoms as far as Remire islands; but those of larger draft should pass outside all, taking great care to avoid Cospatrick and Les Battures shoals.

In passing Le Malingre islet, great attention must be paid to the lead and do not shoal to less than 4 fathoms until the lighthouse on fort Cépérou bears southward of S. 42° W. (S. 45° W. mag.) to avoid St. François rock. Until a pilot is obtained off Le Mère islet it will be better to remain under commanding sail, making short boards, guided by the lead, not standing out into a greater depth than 5 fathoms to avoid the outer current, nor standing in, within the line of Le Mère islet on with Le Malingre, to avoid St. François rock.

The bar may not have a greater depth than 10 feet at high water springs, though it has as much as 17 feet. The best water over the flats in the approach generally lies with Aimable rock buoy between the bearings S. 3° E. (south mag.) and S. 20° W. (S. 23° W. mag.). The changes, however, are so great that a stranger will incur great risk in attempting to enter without a pilot.

Anchorage.—Should it be found more convenient to anchor outside the bar, great care must be taken to see that the bottom is of soft mud, which is generally pointed out by the smoothness of the water. On these spots, between April and November, a small vessel may venture into little more than her draft, as no harm will come should she touch the ground. In the other months and with spring tides, anchorage here, however, is attended with considerable risk, particularly if the anchor be dropped on hard mud. At this period rollers prevail with NE. winds, rising so rapidly, and breaking so violently, that a small vessel is exposed to imminent danger. With spring tides the sea will sometimes top, without any warning whatever, in 8 fathoms of water.

Vessels should not anchor between the submarine cable buoys, or with fort Cépérou between the bearings of S. 15° W. (S. 18° W. mag.) and S. 29° W. (S. 32° W. mag.).

At no time should a vessel bring up to the westward of the entrance. In the fine season a vessel of very light draft may anchor between Le Père and Le Malingre islets, or between the latter and Cayenne, but it must be on soft bottom. The nearest permanent anchorage, for large ships, is the one at Salut isles.

Tides.—It is high water, full and change, at the entrance of Cayenne river at 4h. 37m. At the equinoxes the rise is 10 feet, at ordinary springs 7 feet, and at neaps from 4 to 5 feet. On the bar at high water springs there is sometimes a depth of 17 feet. Near the coast the flood stream sets to NW. with a velocity of 2 to 4 knots an hour, varying with the seasons, being greatest during summer months.

The ebb stream sets to NE. with a velocity of one knot an hour. Between Cayenne and Enfant Perdu the flood stream sets from SSW. to WNW., and the ebb from N. by E. to E. by N.; the ebb is the stronger stream, varying in velocity from 1½ knots an hour at neaps to 2½ knots at springs.

Upper river.—At 9 miles within the entrance, Cayenne river divides into two branches, known as Tonnégrande and Cascades rivers.

Tonnégrande river is navigable as far as a town 2 miles within the entrance.

Cascades river is navigable for about 10 miles.

Enfant Perdu.—This small flat rock lies northward 6½ miles from the fort at Cayenne. It is elevated only a few feet above the sea, and from its base a flat rocky ledge, always breaking, extends 200 yards. Between the rock and the main the ground is soft mud, but the depths have so decreased (1881) that vessels can not now anchor there.

Le Machoiran Blanc is a small rock lying S. 31° W. (S. 34° W. mag.), distant 1½ miles from Le Malingre islet, or about midway between it and the land. This rock uncovers at low water.

A small head, which uncovers at low water, lies N. 11° W. (N. 8° W. mag.) of Machoiran Blanc, distant ¼ mile. Between Machoiran Blanc and Le Malingre islet the passage has silted up and should not be used.

Caution.—The mud bank fronting the shore in the approaches to Cayenne has extended considerably, so that there is much less water in places than is shown on the chart.

Remire islands are five small wooded islets lying on a NW. and SE. bearing, at 2½ to 4½ miles from the NE. side of the island of Cayenne and about 13 miles westward of the Connétables. Le Malingre, Le Père, and La Mère are of considerable elevation, and the two latter may be seen soon after making the high lands of Cayenne and from off the Connétables. The other two, known as the Les Mamelles, about 80 feet high, are very small and lie close together, at about ½ mile eastward of La Mère islet. The tidal streams set between these three latter islets with such extreme velocity that they are dangerous to approach in light winds.

Le Malingre islet, 180 feet high, and surmounted by a single tree, which appears conspicuous when bearing SE., is the smallest of the three islets.

A rocky ledge extends about 400 yards under water in a southerly direction from Malingre islet.

Le Père islet, 341 feet high, lies southeastward, distant 3¼ miles from Le Malingre. It is a little smaller than La Mère, and a rocky ledge extends 200 yards from its SW. extreme; a similar shoal ledge extends ¼ mile from the NW. extreme. There is a semaphore station on the island.

La Mère islet, 377 feet high, lies 2 miles from La Père. It is the pilot station, and the islet is surmounted by a pilot's flagstaff.

Mahuri river.—The mouth of this river is situated immediately east of Cayenne island, and as it lies directly under Mahuri tableland (607 feet high), one of the most elevated parts of the island, the entrance is easily made out. The eastern side of the river is very low, and the silt, depositing itself on this side, forms an extensive shallow flat, which sometimes extends nearly to the Remire islands, leaving the deepest part of the channel towards the Cayenne shore. Although this river has less depth at its entrance (8 feet at low water in 1877), and is more difficult to navigate than the Cayenne, it has more water within the bar, which enables a vessel drawing 12 feet to lie afloat at all times, an advantage which the Cayenne river does not possess.

On the western side of entrance within Diamond point, is La Bonne Amédée rock, at 400 yards off shore, and between it and Mahuri point, about one mile within, foul ground extends ½ mile off shore.

Coast.—The coast from Mahuri river to Apruague, a distance of 27 miles, trends to the southeastward, and is only visible from a distance of 7 or 8 miles. It is backed, however, by a uniform ridge lying parallel to the shore and not far inland, named the Kaw mountain, which may be seen from a great distance and is a good guide to passing vessels.

Kaw river.—This stream reaches the sea at about 10 miles SSE. of the Mahuri, but the entrance is narrow, shoal, and difficult to recognize among the mangrove trees. Very small craft can enter at high water in depths of about 10 feet, but there are many snags within the entrance points to be guarded against.

Connétable islets, are two small, rocky, barren islets, the eastern of which lies northward distant 15 miles from Béhague point. This islet being the larger is known as Le Grand Connétable and is 164 feet high, and may be seen in clear weather from a distance of 20 miles; it is bold and steep to. The western islet, known as Le Petit Connétable, lying S. 70° W. (S. 73° W. mag.), distant 1¾ miles from the larger islet, is quite flat, and at high water springs is not more than 3 or 4 feet above the sea; northward and southward of this islet breakers extend about 75 yards. In the channel between Les Connétables the depths are from 5½ to 7 fathoms, but in consequence of the strength of the current a vessel should not take this passage. Between the islets and the mud bank, which skirts the shore, the soundings gradually and slowly increase in depth from the shore; but outside the islet they deepen abruptly from 8 fathoms.

An American company has obtained the concession to work the guano on the Connétable islets. The configuration of the islets will thereby be altered.

Signal station.—There is a signal station on the summit of Le Grand Connétable.

Dues.—Vessels enter and clear at Cayenne. Reports are at variance regarding transportation to Cayenne and the payment of dues.

Supplies.—Ships' provisions can be obtained, but there is no water on the island.

Anchorage.—There is a good anchorage on the SW. side of Le Grand Connétable island, in 6 or 7 fathoms of water, mud bottom. It was intended to load vessels alongside the island, where there is a depth of water of 6 fathoms. The anchorage is unprotected, but there is never much swell. In winter the prevailing winds are from the NE., and in summer from the SE. A strong current is always setting to the NW., being strongest in summer.

Les Battures.—This dangerous shoal, having 11 feet over it and on which the sea breaks heavily in stormy weather, lies N. 14° W. (N. 11° W. mag.), distant 5½ miles from Le Grand Connétable, with depths of 9 to 12 fathoms between, over soft mud. In calm weather the position of this shoal is only indicated by ripplings.

Cospatrick shoal.—This danger, which has 2¼ fathoms over it, lies N. 14° W. (N. 11° W. mag.) of Les Battures, distant 1¼ miles.

Clearing mark.—The southern part of the tableland of Mahuri, in line with the summit of La Mère islet, leads north of Cospatrick shoal. mont Bourda, open southward of Le Père islet, leads midway between Les Battures and the Connétable islets.

Caution.—Sailing vessels should not take any of the channels within Cospatrick shoal without a commanding breeze.

Tides.—Between Le Petit Connétable and the mainland it is high water, full and change, at 5h. 0m.; springs rise 8½ feet, and neaps from 4 to 5 feet.

Current breakers.—During the summer the current runs strongly to the northwestward in this vicinity, but in the winter it is overcome, to a considerable distance from the land, by the tidal streams, especially on the ebb at springs, which, being augmented by the large outpour from Apruague river, runs to the north and NNW. with great force, causing, at 3 or 4 miles outside the Connétables, heavy breakers, which generally subside at slack water, if the outer current be feeble. The line of ripple or broken water has the appearance of shoal ground, especially as it runs along the edge of muddy water.

Apruague river has a depth of 11 feet at high water neaps on its bar (1892). Vessels of 10 feet draft can proceed as far up as the settlement of Guisanbourg, about 10 miles from the mouth. The entrance lies northwestward about 30 miles from cape Orange, and is easily distinguished by Béhague point, also by the wide entrance of the river itself, within which (at about 6 miles from Béhague point) are two low islands, with a sandbank extending from them in a northerly direction. The right bank lies nearly north and south, whilst the opposite side diverges to the NNW. and NW. without forming a distinct point, consequently all the mud carried out of the river is deposited to the westward, forming an extensive shallow flat, only passable for very small vessels. This river winds inland very far, and is reported to join the Maroni.

Directions.—Vessels should keep in a depth of 2 fathoms at low water until the two islands at the entrance of Apruague river bear about south. Béhague point should be passed close to, and the right bank of the river kept near, as far as Guisanbourg; above this point to Torépé falls (the limit of navigation for small vessels), the river is obstructed by shoals and sandbanks. The river is subject to changes and a pilot should be employed.

Coast.—Béhague point which is covered with high trees, is prominent when seen from the eastward, appearing detached from the adjacent low shore. A bank of soft mud, with depths of less than 3 fathoms, skirting the shore for a considerable distance, stretches from Béhague point to the northward for 10 miles or more and is extending every year. From the point the coast sweeps around to the SE. for 20 miles to the base of mont d'Argent, and the low trees upon it can only be seen at a short distance. A little eastward of the meridian of the point and about 9 miles inland is mont Carimaré.

Oyapok river.—Between mont d'Argent and cape Orange a large funnel-shaped bight is formed, 12 miles wide at the outer extreme, and difficult and dangerous to navigate. The entrance channel has about 7 feet at low water, and 19 feet at high water, but can not be navigated without local knowledge. Small vessels ascend the river as far as the settlement of St. George, 30 miles above mont d'Argent. The western shore of the river, behind the low overflowed land in the foreground, rises into many hills and mountains, which appear, when seen from a distance, like islands; these are the eastern elevations of the chain occupying the interior between Oyapok river and Cayenne.

Mont d'Argent., the most prominent of these hills, is situated close to the NW. entrance point of the Oyapok, and in clear weather the grove of trees on its summit may be seen from a distance of 20 miles seaward; it may, however, be mistaken for mont Carimaré, which is of the same form but situated further to the westward. Between these two mountains there is also a hill of similar shape, but much smaller and less elevated, known as False Mont d'Argent, and behind it again, rise several other peaks, the most remarkable of which are the Trois Ermites. Near the head of the estuary of the Oyapok, on the point of land which separates the Uanares from the Oyapok, stands mont Lucas, a small but moderately elevated hill.

Anchorage.—Temporary anchorage can be obtained near a rock marked by a beacon under mont d'Argent, but it is not recommended. Mont d'Argent bearing from S. 8° W. (S. 11° W. mag.) to S. 20° W. (S. 23° W. mag.), leads from seaward to this anchorage.

Directions for Oyapok river.—The channel between mont d'Argent and mont Lucas has not been thoroughly examined, and vessels are obliged to follow a narrow and shoal channel on the western side of the estuary lying in a direct line between those hills, and in which there is a depth of 7 feet at low water.

Above mont Lucas the channel is divided by numerous islets, the principal of which are isles Biche, Luminabo, Caroline, and Perroquets.

The Oyapok takes its rise far in the interior, and, being joined by several lesser streams, conveys a large and rapid body of water to the sea, so that vessels should not enter before the commencement of the flood stream.

Uassa (Curipi) river.—The mouth of this river, 1¼ miles broad, lies about 5 miles southward of cape Orange; the general direction of the stream is SSE.

The shores on both sides of Uassa river are intersected by creeks and covered with mangroves, being submerged at high water for a distance of 6 miles; within the entrance the depths in mid channel are 8 feet, over soft mud; above this point the depths decrease to 3 feet at low water.

At 15 miles within the entrance the river is considerably narrowed, and during the dry season this is the limit of navigation; above this point (known as Manama) the river deepens, and at its junction with the Uassa is 5 fathoms deep.

In the Uassa the downward current attains a velocity of 3 miles an hour.

Cape Orange.—The land about cape Orange is very low, but as this promontory forms the eastern side of the entrance of Oyapok river it is easily discernible from the eastward; when seen from this direction the hills on the west side of the river will be visible behind it. The trees on the extremity of the cape are much higher than those in the vicinity, and are visible from a distance of 12 miles.

Mud bank.—A mud bank extends about 18 miles eastward of the cape, at which distance there is only a depth of 3 fathoms; but to the northward of the cape the great strength of the current from the eastward and the stream of the Oyapok from the southward sweeps away the mud from the shore, and at 6 or 7 miles from the coast in that direction there are 5 fathoms, the bank being steep-to. In rounding cape Orange a vessel should not come within the depth of 6 fathoms.

Tides.—In the vicinity of cape Orange it is high water, full and change, at 6h. 0m., and springs rise from 12 to 15 feet; the flood runs northwestward, the ebb northeastward, about 3 knots an hour. In the offing the general current takes a NNW. course and runs from 20 to 70 miles per day, being strongest in the summer.

At St. George anchorage it is high water 3 hours later than at mont d'Argent; springs rise from 5 to 9 feet.

During the rainy season the flood is not strong enough to overcome the downward current.

CHAPTER II.

COAST OF BRAZIL.—GENERAL REMARKS ON WINDS AND WEATHER—CURRENTS—ROUTES.

Brazil occupies nearly half the continent of South America. It is bounded on the north by Guiana, Venezuela, and Colombia; on the NE., east, and SE. by the Atlantic ocean, and on the west by Peru, Bolivia, and Paraguay. Its greatest length is about 2,600 miles and the extent of its coast line is nearly 3,800 miles. The area of Brazil is estimated to be 3,251,829 square miles, divided into a federal district and twenty States. An official estimate of the population in 1888 places the number at about 14,000,000.

This vast territory presents two contrasted regions, the wide, low-lying, and humid forest plain of the Amazon in the north and the uplands in the south, which are traversed by radiating hills and mountain ridges, with wide grass plains between woods and bush covered country. The highest mountain ranges of Brazil rise in the center of the southeastern uplands, where the montes Pyreneos rise to a height of 9,700 feet, the coast range or sierra do Mar, south of Rio de Janerio, reaches nearly the same height, and the sierra des Orgõs (Organ mountains) at the back of Rio have summits 7,000 to 8,000 feet high.

Productions.—The forests of Brazil supply large quantities of useful timber, as well as dyewoods, and gums (such as the valuable India rubber), the coco, sago, and wax palms, nuts and fruit trees of many kinds, and the medicinal chinchona abound; and under cultivation are the coffee and tobacco plants, the sugar cane, cotton, rice, manioc, and banana. The mineral products consist of gold, which is found in many parts, especially in the mountains around the head of the São Francisco river; quicksilver, copper, iron, and salt are abundant. Brazil is also rich in precious stones.

The large wild animals of the forest are the jaguar, puma, and tapir; and along the streams the capibari, or river hog, is abundant; the rivers teem with alligators and fish; in the woods and grassy plains will be found the rhea or American ostrich, toucans and parrots, and numerous humming birds.

Races.—The inhabitants of Brazil present three types—that of the aboriginal Indians, that of the European colonists and their descendants, and that of the Africans introduced originally as slaves. There are also large numbers of half-castes from the intermixture of these types. The aboriginal Indians are found in numerous small tribes in the forests and plains of the interior. The descendants of the Portuguese settlers are the most important section of the European types.

Climate.—The vast territory of Brazil presents remarkable gradations of climate from north to south; it is, however, greatly influenced by the amount of rain and the duration of the rainy season.

The great northern lowlands possess a very hot and moist climate. On the elevated southern tropical highlands the climate varies considerably, while towards the extreme south it is comparatively cool, with four seasons, heat, however, being the predominating element.

In the northern part of Brazil there are two regular seasons, a wet and a dry. The wet season along the basin of the Amazon, in the north, is from December to July, while the rest of the year is fairly dry. Across the higher southern watershed of this river, from Maranho, Acuna, Goyaz, and North Matto Grasso to the falls of the Madura, the rainy season is from October to March.

Along the NE. coast, through Ceara, Rio Grande do Norte, Pernambuco, and North Bahia, the rainy season is from March to August, during which there is scarcely any wind and the temperature varies but little throughout the day. In the months of January and February, when the winds from ENE. are the most frequent and have the greatest force, rain falls for a fortnight or three weeks from cape St. Roque to Pernambuco, but not in any great quantity. This rain is less frequent as we advance southwards. The inhabitants of Pernambuco call the rain which falls at this period "the little rain."

At Ceara, Pará, and Bahia the heaviest rains occur in April, while at Pernambuco July is the most rainy month. The coast from Southern Bahia to São Paulo and the valley of the San Francisco do Norte has a double rainy season, the greater being in April to May and the lesser in October.

The dry season commences in September and continues till February; during this period there is occasionally lightning and thunder, but seldom rain, even in the squalls, which come nearly always from the north and west. During this season it is always cool in the morning and evening, while the heats of noon are tempered by a steady sea breeze.

In the wooded districts of Ceara, Rio Grande do Norte, Pernambuco, and Parahiba the absence of rain often causes great droughts.

At Rio de Janeiro hot weather prevails from October to May, during which there will be frequent spells of a few days in succession, when, from 10 a. m. till 4 p. m., the temperature will be about 85° in the shade. But, commonly, such hot spells, after continuing two or three days, are followed by heavy rains, lasting through a night or day, and which leave the atmosphere fresh and pleasant for several days.

It rains much more in the last month of the northerly monsoon, which is generally the dry season, than during the rest of the year. From November to March there are frequent squalls at about sunset, accompanied with thunder and heavy rain, to which succeeds quickly a fine clear sky.

In São Paulo the rainy season is from November till April; south of São Paulo the rains are irregular, and the four seasons begin to be distinguishable.

At Santa Catharina squalls and heavy rains occur during some months of the dry season. The worst months of the rainy season are marked by frequent fogs, by continual humidity, and heavy rains, which prevail sometimes ten or twelve days successively. At this time of the year frequent sickness occurs, occasioned by the excessive damp; the heats which follow increase rather than check it, and it has been asserted that the sickness is great in proportion to the diminution of the average amount of thunder experienced at the time of the equinoxes.

The temperature of various places along the coast of Brazil is as follows: At Pará and Maranhão the mean is about 76° at night to 84° in the day, and sometimes it reaches to 95°; at Pará the temperature during three years only once reached 95°; the greatest heat of the day, about 2 p. m., ranges generally between 89° and 94°; the air is never cooler than 73°, and the mean of the year is 81°; at Ceara it ranges from 83° in the coldest to 95° in the hottest months; at Pernambuco it varies from 77° to 86°, with a slight decline in the rainy season; at Bahia, from 75° to 85°; at Rio de Janeiro it is a little less than at Bahia, and the mean temperature for thirty years is stated to be 74°; at Santa Catharina it descends to 54° during the winter months, in June and July; and at Rio Grande do Sul, during the same months, to 44° and 40°, and it rises to 88° in summer.

WINDS AND WEATHER.

North Atlantic.—In the North Atlantic ocean, beyond the polar limit of the trade, the winds are variable. Generally the winds west of 60° W. and north of 25° N. are from SE. to SW.; north of 40° N. the prevailing winds are from SW. to NW. from April to November, and from west to north from November to April. During this later period the gales from west and NW. are quite frequent and of considerable duration. East of the Azores and from the Canaries to the British Isles the winds are from NW. to NE. and east. In that part of this region to the westward of Europe the winds from the SW. and west prevail to a great extent during the summer and autumn.

The average polar limit of the trade winds in the Atlantic varies between the parallels of 22° N. and 27° N. From June to October, inclusive, this limit will average about 26° N., and from November to May, inclusive, about 23° N. The NE. trade is generally met with to the southward, or in the vicinity of Madeira.

The equatorial limit of this trade wind is generally variable from the same cause; it travels from 12° N. in August to 2° N. in February, on the meridian of 26° W., but seldom passes southward of the equator.

Between the equatorial limits of the NE. and SE. trade winds there extends the zone or belt of calms and light airs called the "doldrums." This zone is narrowest in February and March and broadest in September, averaging nearly 100 miles in the former month and 400 miles in the latter.

Near the equator the winds generally draw more from east to south than from east to north.

The NE. trade wind varies considerably under the influence of the land, and to the eastward of longitude 25° W., within 400 or 500 miles of the coast of Africa, it blows more from the northward than it does in the open ocean. Between the Canaries and Cape de Verde islands during the northern summer months it blows from NNE. to NE. for 55 days out of every 100.

South Atlantic.—In the South Atlantic ocean the limits of the trade wind vary about 3° north or south with the declination of the sun, as in the North Atlantic. The equatorial limit changes from 3° N. in August (sometimes it reaches 5° N.) to 1° in February on the meridian of 26° W., and the polar limit lies in a line between the cape of Good Hope and the islands of Trinidad and Martin Vaz; beyond this limit westerly winds are predominant, varying from NW. to SW., but they are changeable and irregular. In the zone between the parallels of 28° and 35° S. the winds are extremely variable, but those which are from NE. to NW. round by north, and from NW. to SW. round by west, principally during June, July, and August.

East coast of South America.—During the month of December, when the trade winds have reached their greatest northing, they commence to veer regularly to the southward; the mean direction is then about E. by N. or east on the parallel of Bahia, and NE. on the parallel of 21° S.; in April they are ESE. on the parallel of Bahia, and east or E. by S. on that of 21°.

In April and May the change is more sensible, and continues so until July, when they reach their greatest southing. The winds then blow from SE. by E. to ESE. on the parallel of Bahia, and from east to ESE. on that of 21°. At the end of July they begin to shift to the northward; the change is more rapid in the first months; then it continues regularly until December. The average variation is about five points; it is greater to the southward, and on the coast, than seaward.

Between cape St. Roque and Bahia the prevailing wind blows from ESE. between September and March, but more southerly during the remainder of the year. Occasional squalls from north to west are experienced during October, November, and December. In April, May, and June, the rainy season, the winds veer at times to SSW. with squalls.

Between Bahia and Rio de Janeiro as the southern limit of the trade winds is approached they become variable, and the periodic winds from the NE. and SE. are well marked, especially in the neighberhood of the coast. From September to February, the prevalent winds are from NNE. to east, blowing strong in December; in January, February, and March there are occasional squalls from north and west with rain and thunder. In the latter month the winds are light and variable. During April, May, and June the prevailing winds are from SE. to east, light and variable with occasional squalls and rain from SW. and thunder storms from NW. In July and August the winds are from SE., occasionally veering to SW. and blowing strong. Off-shore winds are light and variable, with squalls, rain, and thunder from the SW and NW. In September there are light airs from east and south.

In January, off capes Frio and St. Thomé, the proportion of NE. winds to those from SW. is 15 to 1; this is the most unfavorable time for vessels bound to the northward. In December, when the NE. winds are the strongest, they are about 4 to 1. In May, winds from NE. and SW. are about equal. In July, when the wind begins to shift to the northward, there are about two NE. winds to one from SW.

Off these capes the SE winds are the most frequent in October and November, March, April, and May; but in October they prevail the most, being then about 27 per cent.

The Abrolhos squalls are frequent between May and August, when the season is wet; NW. squalls in the vicinity of Rio de Janeiro, named Terre Altos, last about five or six hours.

Between Rio de Janeiro and the rio de la Plata from October to April the winds prevail from NNE. to ENE., and when strong they are followed by a calm and a SW. wind. From May to October SW. winds prevail with occasional gales from SE. to SW.; during July, August, and September westerly winds are rare, and are usually accompanied by dirty weather.

July, August, and September is the season of the pamperos or SW. storms in the rio de la Plata; they extend as far as longitude 48° W. and between the parallels of 31° and 40° S.

On the coast between cape Frio and rio Grande do Sul, heavy squalls and gales similar to the pampero of the rio de la Plata, from SE. to SW., and occasionally from NW., are experienced; they seldom, however, last more than a day or two, but blow furiously at times. Their indications are the same as those of a gale in Europe. If the sun sets surrounded by heavy clouds, and the land appears very clear and near the spectator, the wind may be expected to blow hard from the south to SW. The duration of these gales is less in proportion to their strength. Their strength and duration diminishes in proportion as cape Frio is approached.

When the winds from SE. to SW. of the southerly periodic wind are moderate, they draw to the east during the day and the west during the night. As soon as the wind veers to the east the weather becomes fine, but when it draws to the west it becomes cloudy and unsettled.

About 25 miles from the land the ordinary force and direction of the periodic winds will be found. About the equinoxes, but more especially when the sun is advancing northward, calms and light winds, with apparently no settled direction, prevail near the coast, and this may be said to be more particularly the case between the Abrolhos islets and cape Frio.

Between the rio de la Plata and Magellan strait, westerly winds prevail throughout the year and generally brings fine weather. With moderate northwesterly winds, dense fogs have been experienced from February to October, inclusive, between lat. 46° S., long. 60° W., and lat. 38° S., long. 52° W. On each occasion the fog cleared when the wind shifted to the southward of west. From September to June, the westerly winds are often interrupted at full and change of the moon by SE. gales accompanied by rain, thick weather, and a heavy sea. In May and June southerly winds are experienced, also during July, August, and September, when they are more frequent than in summer; easterly winds bring rain and sometimes fog.

Severe gales, with a cross and turbulent sea, are frequently encountered to the southeastward of the rio de la Plata between 200 and 300 miles from the coast. As these gales are often experienced in a region where sudden changes of temperature are observed, the bad weather may be attributed to the meeting of the warm and cold waters of the Brazil and Cape Horn currents.

The local winds will be found described in the chapters to which they relate.

Southeast Periodic wind.—The average direction of the trade wind varies three points between summer and winter, and in the season from April to September the SE. Periodic wind is generally replaced by variables from south to west, which are the termination of the pamperos of La Plata. They bring clouds and rainy weather, but arriving in the latitude of La Plata they lose their strength, and last only two or three days, with squalls of some hours' duration, which aresucce eded by calms and fine weather, if the wind veer to the SE. and east.

Besides squalls from the SW. there are often those from the SE. in the vicinity of the Abrolhos islets, and also from the NW. with rain and thunder, which is felt equally along the coast and in general a little seaward.. During this periodic wind, between Bahia and Rio, at 90 to 120 miles from the land, the winds are light and variable, with squalls and rain from the SW., thunderstorms from the NW. and variable winds from east to south.

The barometer will fall twenty-four hours previous to SW. winds, and rise with those from the east. The rain and wind from the SW. are more frequent at the time of new or full moon; an index of the weather will also be found in the general laws of the evolution of the winds in the southern hemisphere. If during bad weather the wind follows its regular course against the hands of a watch, and veers from SW. to

SE. and east, it is *a sign of fine weather; but if it veer from SW. to west and NW., bad weather may be expected.*

Northeast Periodic wind.—*The NE. winds* off the Brazil coast commence in September, but *it is not until* December and January that they acquire their *full force, when they* are often fresh, but it is rare that within 30 or 45 miles *of land* they blow hard for more than two or three days; there the winds are generally more moderate, allowing coasters to work to the northward. During this season the weather is fine, the sky clear, but the horizon hazy.

In the vicinity of capes St. Thomé and Frio, the winds during summer often blow very fresh from the NE., causing much sea and a strong current. Vessels of small steam power can hardly proceed against it, and are often obliged to seek shelter. These strong winds which pass over the low land of cape St. Thomé are checked by the high mountains of Macahé, and are not felt westward of cape Frio.

Land and Sea breezes are felt, more or less, along the whole coast of Brazil; the land wind is often feeble, of short duration, and not to be depended on. During the NE. periodic wind the land winds are more regular and stronger than in the SE., because the trade winds then blow more directly and constantly on the coast, and the reaction caused by the coolness of the nights inland produces stronger and more regular effects. In the SE. periodic wind, the winds being often variable from about SSW., the land winds mix or unite with them. The stronger the sea breeze is, so is also the land wind.

CURRENTS.

The currents of the ocean are properly distinguished by the different and significant names "stream" and "drift." The drift current is merely the effect of the wind on the surface of the water, as for example, in the region of the trade winds, where the whole surface of the sea, generally speaking, is converted into a slow current moving to leeward. A drift current is therefore shallow as well as slow, and can run in no other direction than to leeward.

The stream current has been described as an accumulation of the parts of the drift into a collective mass by the intervention of some obstacle. The mass then running off by means of its own gravity, and taking the direction imposed on it by the obstacle, becomes a stream current, in many cases very powerful, pursuing its way like a vast river through the ocean.

Stream currents would appear to be farther dependent on the inequality of heat received by the earth from the sun in the tropical and polar regions. Experience proves that warm water flows in an upper current from low to high latitudes, and thus the diurnal rotation of the earth, as well as the configuration of the sea coast and ocean bed, affects their direction.

Equatorial current.—The Equatorial current, in its course between the continents of Africa and America, may be considered chiefly as a "drift" current formed of water brought from a cooler region by the SE. trade wind. It may be said to commence in the neighborhood of Annobon island, or just south of the equator, between the second and eighth degrees of east longitude, although from this locality a continuity of the northerly drift along the coast of South Africa, as well as from the Kongo river, may be traced. The surface temperature in its eastern part is several degrees colder for a great part of the year than the adjacent Guinea current, affording evidence of receiving waters from a remote and colder region.

The northern boundary, or rather the well-marked line of separation between it and the Guinea current, has been traced in the space extending from the meridian of Greenwich to 23° W., and is found to vary little at the different seasons of the year; for example, in the meridian of 20° W., the "line of separation" in October and November is in 5° N., in March and April in 2½° N.; in 5° W. longitude the "line of separation" appears to be constant in 2° N. In about latitude 5° S. and longitude 28° W. the Equatorial current divides into two branches, the main branch proceeding in a WNW. direction along the north coast of Brazil and through the West Indies; the other is named the Brazil current.

The Equatorial current appears to attain its greatest volume and velocity during the season of the northern summer. From the African coast to about the 15° of W. longitude the maximum strength has been observed in June and July; westward of that meridian, at successive later periods, or between July and October; being, however, mainly a drift current, it is probably subject to irregularities in strength depending on the winds.

The strength of the current increases as it advances to the westward. On the equator in longitude 20° W. the strength is from 20 to 40 miles a day; near and westard of the Rocas it is from 20 to 60 miles, and off the Amazon river from 37 to 100 miles a day, and is so uncertain as to require the seaman to be ever on the watch by following up his astronomical observations night and day.

Counter Equatorial.—Between July and November, within the limits included between the meridians of 20° and 53° W., and between the parallels of 6° and 9° N., the NW. drift from the Equatorial current appears to be suspended, and an easterly current prevails (probably an expansion of the Guinea current.) Between 53° and 40° W. it attains a rate of 60 miles a day; eastward of 40° it decreases in strength, and between 30° and 20° W. it runs from 30 to 15 miles a day. The southern edge of the stream is from 200 to 400 miles from the coast of Brazil.

Brazil current.—The direction of the southern part of the Equatorial stream appears to turn gradually to the southward on approaching the continent, and from latitude 6° or 7° S. runs along or obliquely towards the coast at the distance of 120 or 150 miles until near the parallel of the rio de la Plata, where it seems to divide into two branches. The larger taking an easterly direction, forms the cross current of the South Atlantic; the other branch, continuing feebly to the southward, is sometimes met with as far as the entrance of Magellen strait.

Inshore currents.—Within a few miles of the coast about cape St. Roque, where a tidal influence prevails, the general Equatorial current is not felt, and in the space between the southern branch of this current and the coast of Brazil, alternate currents are met with, occasioned by the periodical winds on the coast. The force of these currents depend on the strength and direction of the winds. Between Pernambuco and cape Frio, from October to January, the current generally sets to the SW. from 25 to 30 miles a day; from March to September it sets to the northward, attaining its greatest force in June and July, which is occasionally 48 miles a day. Between cape Frio and the rio de la Plata the current generally sets to the southward with NE. winds, sometimes 40 miles a day; SE. winds force the current to the shore with a heavy sea.

Off the entrance of the rio de la Plata the current generally sets to the NNW. before and with southerly winds, and to the SSE. before and with northerly winds, at rates varying from one to 3 miles an hour. An east and ENE. current of one mile an hour, a supposed outfall from the rio de la Plata, has been experienced, extending nearly to longitude 40° W.

At more than 50 miles from the coast of Patagonia very little current is found during settled weather and moderate winds, but before strong winds and while they are blowing the current runs at the rate of one or 2 miles an hour in the same direction as the wind. Nearer than 50 miles from the land the current runs stronger—from 2 to 3 miles an hour—particularly near projecting headlands. Generally speaking, the northerly currents have more strength and run longer than the southerly; they are, however, very irregular. Within a distance of 20 miles from the shore tidal influences alone are felt.

North coast of Brazil and coast of Guiana.—As already mentioned, a great part of the Equatorial current runs along the north coast of Brazil on its way to the West Indies. Its rate may vary from less than ½ mile to 4 miles an hour, according to the distance from the middle of the stream and the season of the year, but it probably attains its greatest strength at 100 or 120 miles from the coast. The outer edge may extend from the coast at a distance of about 240 miles, and its inner edge from less than 15 to more than 45 miles, but the exact position where its strength slackens or its direction changes is uncertain. Within a few miles from the coast tidal streams are perceptible.

During the prevalence of ENE. and NE. winds a current runs ESE. along and near the north coast of Brazil. This fact is well known to the masters of coasters and is taken advantage of by them.

The water forced to the westward by the ENE. winds accumulates on the coast of Guiana, and at Cayenne, during the months of January, February, and March, it is about 6 inches higher than in September and October. In May it begins to fall, when the current appears the strongest, and between Maranhão and the Amazon, at 150 miles from the cost, it has been found setting to the westward 4 miles an hour.

Soundings.—The soundings along the whole coast of Brazil, from cape St. Roque as far south as St. Catharina island, are either too deep or uniform to place much reliance on them in approaching the land. There are, however, places where the timely use of the lead will indicate danger. At about 20 miles nothward of cape Calcanhar, the NE. extreme of Brazil, there is a depth of about 21 fathoms, but 6 miles nearer the cape the bottom is irregular, with depths of 7, 9, and 14 fathoms. At 15 miles eastward of cape Calcanhar there are 15 to 16 fathoms. Off cape St. Roque, at the distance of 9 miles, there are 3 fathoms, and at 17 miles eastward no bottom with 12 fathoms.

Between Pernambuco and the rio San Francisco the 100-fathom line varies from 15 to 25 miles from the shore, and off St. Antonio point, Bahia, it approaches to within 6 miles of the shore.

On the bank extending eastward from the Abrolhos rocks the soundings vary from 15 fathoms, at 10 miles eastward of the rocks, to 45 and 17 fathoms about 68 miles eastward of the rocks, 18 miles eastward of which the water suddenly deepens to upward of 230 fathoms. Owing to the broken character of the bottom, shown by existing soundings, and to the imperfect nature of the surveys, it is probable that many shallow patches exist in the area for more than 200 miles around the Abrolhos rocks.

Routes.—Vessels crossing the equator from north to south are recommended to pursue the following routes, varying according to the season of the year:

In January it is not advisable to cross the equator west of 28° W.

In February, March, and April, after passing the Cape Verde islands, vessels should stand to the southward in 26° W., and when southerly winds are met they should keep on the tack which gives most southing, endeavoring to cross the equator not west of 29° W.

In May it is recommended to cross the equator not west of 26° W. The change of seasons takes place then on the coast of Brazil, and, in addition to a westerly current, a SE. wind would be found near the land.

In June, after meeting the southerly winds (probably in 6° N.), it is advisable to keep on the starboard tack, if any southing can be made, until a sufficient amount of easting has been made to admit of crossing the equator in 30° W.

In July vessels are recommended to proceed as in June, and endeavor to cross the equator in 28° W.

In August the requisite easting should be made when the southerly winds are first met, and the equator crossed in about 29° W.

In September the requisite easting should be made as in August. It is recommended not to cross west of 29° W.

In October the longitude of 29° W. is recommended as the extreme westerly limit in crossing, the requisite easting being made as in August.

In November and December, after passing Cape Verde islands, it is advisable to haul somewhat to the eastward, so as to be in 25° W. longitude when in 6° N. latitude, and endeavor to cross the equator not west of 29° W.

The Equatorial current is not so strong in the winter as in the summer and autumn months, but it must be remembered that its strength increases as it advances toward the American shores.

When in the vicinity of St. Paul rocks astronomical observations should be frequently made, the current watched and allowed for, and a good lookout kept, as the rocks are steep-to and can only be seen a distance of 8 miles on a clear day.

Making the coast.—Crossing the equator between the months of March and September, when the wind is from the southward and eastward and the current near the coast sets to the northward, it will be better to keep from 120 to 150 miles off land until well to the southward, and steer so as to be to windward of the port of destination; but from October until January, when northeasterly winds prevail and the current sets to the SW., the coast may be approached with prudence and a vessel may steer according to circumstances for her intended port.

Coast routes.—Making passage to the eastward along the coast is much less difficult than most sailing directions indicate. It is only during these months when the trades reach their most southern limit and blow with greatest force that it is found difficult to beat around cape St. Roque.

Going from east to west, in order to hold a steady wind and good current it is necessary to keep about 75 to 100 miles off the coast. But if bound to any of the ports along the coast, it would be better to navigate closer in, but not near enough to lose the favorable wind and current. If it is necessary to close with the land, great attention should be paid to the soundings, and vessels should haul off at night to insure safety from the uncertain set of the tides and current close in shore. The time of tide should be calculated, especially on arriving in the vicinity of Maranhão, for in this vicinity they are stronger, and the coast is too low to be seen at any distance at night.

It is considered prudent to steer a course that will place a vessel 20 miles to windward of the port of destination, provided good observations with a trusty chronometer have not been obtained.

It is earnestly recommended *not* to try and make the land in the vicinity of Maranhão, for the positions of the shoals off this coast are uncertain, and the coast itself is too low to be a good guide; besides this the soundings in the vicinity are deceptive, and should a vessel find herself in 12 or 15 fathoms of water, without being *sure* of her position, it is advisable to anchor until daylight.

During the rainy season great advantage is had in keeping far enough off coast to avoid the squalls and sudden shifts of wind that occur, and at all seasons it is advisable not to get in less than 14 fathoms of water, and after passing the Paranahiba river not in less than 17 or 18 fathoms. Navigating from west to east, vessels should follow the coast, taking every advantage of wind and tides. During the months of February, March, April, and May the frequent changes of wind and the occasional change to the westward enable a vessel to make a comparatively short passage.

CHAPTER III.

COAST OF BRAZIL—FROM CAPE ORANGE TO PARÁ RIVER, AND THE AMAZON RIVER.

Coast.—From cape Orange the coast trends southeasterly for 40 miles to cape Cachipour; it then takes a southerly direction for 145 miles to cape North (Cabo do Norte). The whole shore continues low, and is bounded by mangroves of moderate height, which can not be seen at a greater distance than 10 or 12 miles, and being exposed to the varied and violent action of the waters of the Amazon and other smaller streams the outline often changes. Soft mud flats, formed by the débris thrown out of these rivers, extend off in some places to a considerable distance, upon which the mangroves advance with great rapidity in the dry season, and are torn up again by the violent current and the tides produced by the freshets in the rainy months.

Soundings.—The bottom in front of this part of the coast is composed of mud, more or less hard. The 5-fathom line passes about 8 miles northward and 18 miles eastward of cape Orange; it trends along the coast to cape Cachipour, decreasing its distance to 7 or 8 miles; thence it curves inshore to near mont Mayé, where it is only 3 miles off; it then curves out to the eastward, passes 12 miles northward of Maraca island, and passes from 40 to 50 miles to the northward and eastward to cape North.

Customs rules.—The masters of foreign vessels who seek a customhouse port in Brazil shall bring one manifest, a copy of which they shall leave in the consulate. Vessels bound to Brazil and wishing to land their cargoes at different ports, must clear for Brazil and other ports, or for Pernambuco, Bahia, Rio Janeiro, and other ports. Vessels proceeding from one port to another in Brazil must take a bill of health from the local authorities of each port; and where any part of the cargo is landed the same must be noted on the original manifest by the customs officer of the port.

Quarantine regulations.—Special hospitals are provided for the reception of persons from vessels coming from infected ports, and the same regulations govern Rio Janeiro, the provinces of Bahia, Pernambuco, Maranhão, Pará, São Paulo, and Rio Grande do Sul.

Cape Orange is the northern limit of the Empire of Brazil. It is a low point covered with mangrove trees that are sensibly higher than those to the southward, and are visible 12 miles. The cape is also the eastern point of the entrance to the Oyapok river. (See p. 50.)

Cape Cachipour is a low tongue of land and forms the eastern point of Cachipour river. The entrance to the river is about 6 miles west of the cape, and may be recognized by some lofty trees on the west side, which extend along its left bank overtopping the neighboring mangroves.

Coast.—The coast from cape Cachipour to Grande point is low and wooded, with mangroves.

Conani river.—The mouth of this river is known, from the many small openings between this and the Cachipour river, by its proximity to mont Mayé, from which it is distant in a northerly direction about 3 miles.

Mont Mayé.—At about 17 miles NW. by N. of the Calsoene river, there will be seen above the mangroves, a short distance inland, a small space covered with trees more lofty than those in the neighborhood; it has the appearance at a certain distance of a hill, and is named mont Mayé. This is the most remarkable object between capes Orange and North, and in clear weather may be seen at a distance of 16 miles.

Just south of mont Mayé is an opening in the land, about 2 miles wide, leading into Wiwini lake; two small islands lie off this opening, one on each side of the channel, and outside of these is a shallow bank which partially obstructs the entrance.

Calsoene river.—The entrance to the Calsoene is obstructed by a sandbank which extends off to the distance of about 3 miles, and at spring tides it breaks heavily, producing an effect similar to the tidal bore of the Amazon; at all times, but more particularly at this period, boats should be extremely careful how they approach this river.

Nine miles farther south is the Maiacare river, and 13 miles from the Maiacare is the Great Amapa river. These rivers communicate. Several streams enter the sea near Maraca island, two of which, the Amapa and Macary, communicate with extensive lagoons. Amapa bar is dangerous except in fine whether. The cost is low; wooded with mangrove, and is overflowed by the spring tides.

Maraca island lies off the mouths of these rivers and is of recent formation from their deposit. It is divided into two parts by Calebasse creek, the western mouth of which forms a bay sheltered from the sea and strong currents which are found in the channel, and affords the only sheltered anchorage to be found off this shore.

Channels.—The channel which separates Maraca island and the main is from 2 to 5 miles wide; its eastern entrance, named Tourlouri channel, and the narrowest part, is obstructed by mud flats, leaving a small passage near the mainland for vessels of light draft. The western entrance, named Carapaporis channel, is 5 miles wide, and is the channel to the anchorage.

Anchorage.—The best position will be found with the western extreme of the NW. point of Maraca island bearing N. 17° W. (N. 13° W. mag.), and the south point of the entrance to Amapa river, N.

73° W. (N. 69° W. mag.); it is said a vessel here will have not less than 19 feet at low water and be sheltered from the current and rollers.

Directions.—When standing for the anchorage, it is necessary to approach the island from the NNE., as the stream runs to the northwestward. The anchorage is plainly pointed out by the opening which forms Calebasse creek, and a vessel may pass close round this end of the island. A greater depth will be found farther off Maraca, but the current is so very strong that the anchorage would be untenable in spring tides.

Tides.—The water reaches its highest level 2½ or 3 hours after the commencement of the flood, and at the equinoxes it has been known to rise 37 feet and the stream to run for a short period at the rate of 7 knots an hour; its strength, however, rapidly diminishes after three or four days from the full and change. The sea at this period is heavy in the offing. The difference between the level of low water at the springs and neaps seldom exceeds 8½ feet. The stream always runs to the NW., and at the period of high water the land is all overflowed, except at a few spots near the NW. end of the entrance to Calebasse creek.

Caution.—It may be observed here that the teredo is most destructive to boats' bottoms in these waters, and they can not be too often cleaned.

Jipioca island lies N. 41° W. (N. 37° W. mag.), 15 miles from cape North; it is very small, and, being surrounded by shallow banks, is inaccessible.

The bank fronting the shore near cape North, within a depth of 5 fathoms, extends 55 miles in a NE. direction from Jipioca island, at which distance there is only a depth of 3¼ fathoms; beyond this distance it is steep-to. As this bank is dangerous in strong winds, which cause heavy rollers, it is advisable to round it in not less than 10 fathoms.

Coast.—From Maraca island to the mouth of the Araguari the coast is low and frequently alters form, owing to the formation of mud banks and the rapid growth of the mangrove in the dry season, which are torn up again by the violent current and tides produced by the freshets in the rainy season. The coast is frequently overflowed, and is visible about 10 miles.

Cape North (Cabo do Norte) is wooded and low, being but slightly higher than the neighboring coast.

Rio Araguari.—The entrance to the rio Araguari is through an opening of the coast 5 miles wide. It is cumbered with banks, and, being open to the eastward, receives the full force of the sea and the pororoca. The bar has never been carefully surveyed, but the pilots assert that there are deep channels, which are kept open by the pororoca, but subject to great changes. The river is navigable, for all vessels that can cross the bar, 100 miles from the mouth—about 75 miles in a direct line—where there is a fall. This river is the southern boundary of Brazilian Guiana.

Fouro Araguari is a branch of the rio Araguari, and forms with it a large island that has no particular name. The SE. point is called Periquitos, and the NE. point, Grossa. The island is low and subject to great changes in form and appearance.

The Amazon (Amazonas), whose great tributaries traverse all the northern lowlands from the slopes of the Andes to the Atlantic, is the largest river in the world. The area of its valley is 2,300,000 square miles, including 45,000 miles of navigable water communication, and its basin is so low that the whole slope from the Andes to the sea is not more than 250 feet. The most remote source of the Amazon is the Ucayali, a branch of which rises near La Paz, in latitude 18° S. The Marañon, a more northern source, rises in the Andes through the Pongo, or rapid of Manseriche, in about latitude 4° 28′ S., longitude 77° 27′ W. Here the stream in breaking through the central cordillera of the Andes flows between enormous masses of almost perpendicular rock of great height, and covered with rich vegetation. The rapid extends for a length of 6 miles, and the river, with a width of only 150 feet, flows at the rate of 9 miles an hour, forming dangerous eddies, which will not admit either ascent or descent of the rapid. This point is distant from the Atlantic ocean 2,000 miles, but by the windings of the river 3,500 miles. The river is known as the Marañon as far as the meridian of 65° W., where it is joined by the Japura, and is said to be navigable for light draft steamers to Borja, in about latitude 4½° S., longitude 77½° W. The main river is not interrupted by a fall for a distance of 2,500 miles, and is navigable as far as Yurimaguas, a distance of about 2,350 miles. In the rainy season the stream runs at about 4 miles an hour.

The various branches and tributaries of the Amazon are a perfect network, among which lakes and lagoons are very numerous. Its great feeders from the southward are the Jurua, Purus, Madeira, Tapajos, and Xingu. From the northward the Japura and rio Negro, which is joined by the remarkable channel of the Casiguiare to the basin of the Orinoco.

The forests of the Amazon contain a wonderful variety of products; its virgin soil is capable of yielding coffee, sugar, rubber, cotton, and other valuable products in enormous quantities, while the Andes with their wealth of minerals and fleeces are included in the Amazonian watershed. The river abounds in fish, many of which are of the most delicious kinds; and turtles of an excellent quality are numerous. The Amazon traverses regions which are inhabited by numerous tribes of savages. Large alligators are seen stretched motionless in the mud, like trunks of trees.

The mouths of the Amazon, between cape North and Tijoca point, extend over a space of 180 miles. One great feature of the river is that it has no delta of accumulated mud extending into the sea, like the Mississippi, the Nile, and the Ganges; yet it carries an immense amount of mud in its waters. It is said, however, that the Amazon once extended 300 miles beyond the present mouths, and that therefore the ocean is rapidly encroaching on the northern continent of Brazil.

Climate.—The climate of the Amazon is generally healthy, though several of the localities under unfavorable circumstances are unhealthy and subject to endemic disorders, such as intermittent and pernicious fevers, dysentery, and catarrhal and nervous affections.

Temperature.—The temperature of the coasts of the province of Pará and in the Amazon river varies between 70° and 92° during the day, and between 67° and 72° during the night; the air is cooled by the vicinity of large water courses and lakes, as well as by frequent and periodical rains, almost always accompanied by violent squalls. The difference between the temperature by day and that by night is very great; the refreshing coolness of the night is dangerous if indulged in too freely without taking any necessary precautions.

Electricity.—There is not, perhaps, any part of the globe where electrical phenomena are produced with greater frequency and intensity than on the coasts of Pará, and especially in the Pará river and that of the Amazon. Nothing indeed can express the force with which these phenomena sometimes appear; houses, vessels, the earth itself trembles at every commotion as if shaken by an earthquake; and the sky, the color of bitumen, is incessantly broken during the storms by the lightnings, which sometimes illumine the whole horizon. It is seldom, however, that the lightning affects the town of Pará, the churches of which, with their high spires, seem as if they must be struck every day. The large trees in the neighboring forests doubtless serve as conductors, for it is on them that the electric fluid generally descends.

The Seasons.—The year here is divided into two seasons, the rainy or winter, and the dry or summer season. The former begins generally in January and ends in June, the latter begins in July and ends in December. In the winter the rain sometimes falls without interruption and very heavily for a whole week, during which time the sun is rarely seen. The river and its affluents begin increasing from the commencement of this season, and in December the large lakes are united with the rivers, and in their course carry along an abundance of vegetable matter, of entire trees, and sometimes of floating islands torn from the banks.

Then, the water of the rivers near the lakes is unwholesome and dangerous, and is only fit to drink by filtering, or by the immersion of a red hot iron, the effect of which is to neutralize the vegetable matter. The waters continue increasing till the rains are over. When the rains have ceased, the river, which has overflowed all the lowlands, soon falls to its bed and leaves as traces of its passage a fertilizing soil and thousands of trees it has washed down, and which are carried off into the sea at the next overflowing.

Winds.—In the summer the winds blow continually from the east, moderately during the months of July and August, but very strong during the other months of the season. They are called general winds. It is then that the daily squall is most violent, and sometimes acquires great force. The winds in summer veer from about ENE. to ESE. As the general winds blow up the river, that is the best time for ascending the Amazon. The country boats, when going to Pará from the upper part of the river, drift along without sails, being quite incapable of working against a contrary wind, which is often very strong.

In winter, the general winds are only felt at long intervals, the calms predominate, and are only interrupted by heavy squalls of wind from the NE. round by west to SW., accompanied by torrents of rain. The navigation upward then becomes slow, whilst the descent of the river becomes more rapid from the increased power of the currents.

Currents.—Height of river.—The waters of the Amazon rise during six months, and then, having reached their greatest elevation, fall during the other six months of the year. During August and September the snow on the Andes begins to melt, but its influence is slowly felt by the Amazon. It begins to rise in the month of November; the inundations in the lower parts of the river take place in January, February, March, April, and May; the winds from the NE., which then prevail and blow strongly at the mouth of the river, retard the stream of water from the river and contribute greatly to the inundations.

The rise is from 30 to 50 feet, and at times the whole basin is under water. By a singular operation of natural causes, the water in the southern tributaries of the Amazon is high, while that in the northern is low, and *vice versa*. In the Madeira, a southern tributary, the water is at its highest in April, the difference between high and low water being about 50 feet.

Off the mouth of the Amazon, the surface water of the Atlantic ocean, continually blown toward the west by the general winds, causes a current to the NW., which generally attains a rate of 2 miles an hour, and sometimes as much as 4 miles. At the right angle of the stream of the Amazon the current trends toward the north, produced by the mass of water projected toward the NE. from the river; but it soon attains the mastery, and carrying along with it the water thus projected, acquires greater force. The stream of the Amazon, which is black, discolors the ocean for a distance of 50 miles from its mouth.*

Tides.—The tides in the vicinity of the Amazon are subject to so many variations and irregularities that it is difficult to denote precisely what course they follow; their exact duration, height, and strength all depend on the force of the wind, on the abundance of rains, or capricious changes in the direction of the current. They may be dividde into two parts; those which occur between Maranhão and the mouth of the Amazon, and those between the east mouth of the river and cape North. The first are regular, and though affected by the various rivers, they follow the general law of tides of six hours.

---

*Col. Sabine states that he found the stream of the Amazon in blue water in lat. 5° N. and long. 50½° W.

Their direction and strength vary according to their distance from the land; the flood tide generally runs SW. near the coast and WSW., or more westerly, at some distance from it; it has a mean rate of 2½ miles an hour near the land, which diminishes as the distance from the coast increases. The ebb tide sets about ENE. near the coast at the rate of 1¾ miles an hour, and trends towards the north with diminished strength, in proportion to the distance from the land. The rise of the tide varies according to the localities; beyond 4 miles from the coast, where the local influences have no power, the rise is 14 feet at springs and 10 feet at neaps.

In the second part, the flood tide, which runs to the SSW. near the mouth of the Amazon, inclines toward the SW. and WSW. in proportion to the distance from the land; and the ebb tide, which sets first NE., inclines toward the north and NW. before it is united with the general current. A difference of two or three hours in the establishment of two places far from land and only 12 miles apart, and a rise of only 6½ feet 12 miles from a point, where at the preceding tide 29 feet had been observed, are two anomalies in the tides quoted as most remarkable amongst others less striking, though numerous on this coast.

As soon as the flood tide begins, the sea near Marajo island rises almost suddenly; during winter it generally rises 16 feet at springs, and as much during the first two hours as the remainder of the flood; it runs at the rate of about 6 miles an hour. On the north side of the river, between cape North and Macapa, the rate is from 8 to 10 miles an hour.

Observations have shown with certainty that there is a difference of level between the Amazon and the sea; for during the rainy season, when the stream of the ebb tide should be the strongest, the flood tide has the greatest velocity. The stream of the flood tide, from the mouth of the river, as far as 90 or 120 miles up the river, begins in December to be stronger than that of the ebb. At cape North, during January, February, March, and April, the flood runs more than 8 miles an hour at springs, and at the ebb from 2 to 4 miles. In May the streams are of equal strength; after May the ebb begins to be the strongest. In August and September the flood is weak, while the ebb runs 5 or 6 miles an hour, but it loses its velocity gradually in October; and in November, the period at which the NE. winds begin to blow, the strength of the streams are again equal.

From this it may be concluded that the waters of the sea are higher than those of the river every time that the flood stream is stronger than that of the ebb, or from December to April inclusive, when the winds blow strongly from the NE.; and also that the waters of the sea are lower than those of the river, or at least have the same level when the ebb stream is stronger than the flood, which is the case from June to October, when the winds are from ESE.

The plains of Brazil, on the right bank of the river, are generally higher than those of Guiana, on the left bank, therefore the overflowing waters of the Amazon spread over the latter, and are increased by the water from other rivers, and that caused by rain. Thus the immense plains of Guiana become at last almost entirely under water.

The tides have been felt at Pauxis, 600 miles from the sea, and it is inferred, from the time the rise of the waters require to travel this distance, that there must be a succession of tides in the river at all times. The regular influence of the tides is felt as far as Obidos, 520 miles from the sea, gradually increasing in height as the sea is approached.

The Bore, or Pororoca, is a tidal phenomenon which sometimes occurs in the western branch of the Amazon at about spring tides.

The bore confines itself to the shallows and affluents, and is not felt in depths over 4 fathoms, except by an increase in the velocity of the stream, so that there is no danger to vessels keeping the main or deep channels.

When it is expected, the coasting craft are stated to confine themselves to the sheltered anchorages found within the mouth of Araguari river and at Maraca island. It is felt more particularly on the northern side of approach or between Maraca island, situated about 80 miles northward of the entrance, and Macapa at about the same distance within the entrance; nearly the whole of which coast comprises low islands fronted by shallow sandbanks. It runs, however, with considerable velocity on the opposite side of the river, as, some 30 years ago, Caviana and Jurupari islands were both divided by the strength of the current, and the channel between those islands rendered unnavigable except by boats.

When it makes its appearance, which is at the lowest of the tide, a roaring sound is heard at a distance of from 3 to 6 miles; as it approaches the noise increases, and soon a head of water, estimated to vary from 5 to 12 feet in height with a breaking face, is seen occupying the whole of the shallow water off Maraca island and Araguari river out to about a depth of 4 fathoms. Its velocity is estimated at from 10 to 15 miles an hour, being strongest and most dangerous in the months of January to June, and at the equinoxes, when the wind is northeastward, and it carries away in its course everything that is opposed to it.

When the wave has passed the water is nearly high, and the stream of flood continues (from 8 to 10 miles an hour in the vicinity of cape North, from January to April, and less than half that amount in August and September), but without perceptibly raising the level of the water in the vicinity of cape North, which is said to acquire all its height (reported as 40 feet) in the short space of about ten minutes.

On the opposite side, off Marajo island, the bore raises the water to mean water level (about 8 feet), the remainder being acquired during the remaining hours of flood.

There is no bore in the Pará, the eastern mouth of the Amazon; but, in Guama river, near the village of Pernambuco, about 25 miles above the city of Pará, the bore makes its appearance near full and change, and raises the water from 5 to 15 feet in a few minutes, whence it rushes up the Guama, dividing at the junction of Capim and Urucuritene rivers, the greater portion of it going up the Capim.

The same thing occurs in Guajara river, situated close southward of the Guama.

The Main Entrance to the Amazon.—The Amazon has two entrances northward of Marajo island; the westward branch lies between Caviana island and the mainland to the westward; whilst the southern branch is between Caviana and Mexiana islands and Marajo island. Little is known of either; the channel leading from Pará river being that used by the river steamers. The following information on those branches, to their junction with the Pará branch, must therefore be received with caution.

The Western branch of the main channel to the Amazon is formed by Caviana and the smaller islands with the extensive shoals extending northeastward from them, and the mainland to the NW. This channel is rendered dangerous by the bore and it does not appear to be frequented. In it are numerous low islands and shoals having deep water between them.

The outer portion of this branch is fronted by an archipelago; the three largest islands are named Balique, Iaburu, and Curua. These islands are separated from the mainland by a channel that is cumbered with banks and shoals; it is, however, most frequented by the coasters bound from the westward, and is said to be passable for vessels of great draft; none should attempt it without a pilot.

Westward of Curua island the coast forms Dejacaré bay, into the southern end of which the rio Gurijuba empties.

North of Jupati point the coast curves slightly to the westward and forms a bay, into which the rio Jupati flows; it is navigable only by boats. Southward of Jupati the coast again curves to the westward, forming another bay with Pedrera point the southern limit.

The southern part of this bay is encumbered with banks that are but little known, and subject to radical changes from the pororoca; the northern part is deep, and in some places there is 8 fathoms within a few hundred yards of the shore. In the space between the west side of Caviana island and the coast there are several sandbanks, which form and are swept away by the currents and pororoca; only the pilots of the country can keep a familiar knowledge of the channels, which are constantly changing their direction. The shores of both these indentations are low and frequently inundated by the pororoca; thick brush wood grows on them whenever sufficient time elapses between the inundations.

Balique anchorage is between the north end of Balique island and Periquitos point. It is always approached from the northward, and can hardly be recommended to vessels without a pilot. The approaches are cumbered with banks, on which the sea breaks heavily during fresh winds.

Balique Island light is a revolving white light every minute, visible thirty seconds and eclipsed thirty seconds; it is elevated 60 feet above the sea, and should be seen in clear weather from a distance of 13 miles.

The lighthouse, 51 feet high constructed of iron and cylindrical in shape, rises above the keeper's dwelling, the whole painted white.

Mexados and Nova islets.—At 18 miles westward of cape Magoari and 2 miles from the shore of Marajo island is the small, low, woody islet named Mexados. From it a shoal extends eastward toward cape Magoari, and also to the westward, passing north of the low and woody Nova islet, and from thence along the coast for a distance of 7 miles, whence its edge trends to the SW. Between Mexados islet and that of Nova, close to the shore, is the small group of the Bentiva and Navios islets.

Frescas island and Jurua bank.—The low, small island of Frescas lies about 34 miles westward of cape Magaori and 3 miles northward of Nova islet. Formerly there existed westward of Frescas an islet named Jurua, which was carried away by the current, leaving a bank, which now extends from Frescas island to the SE. part of Mexiana. The shoalest part of the bank, about midway between the two islands, uncovers at low water, but its southern limit is uncertain.

Mexiana and Caviana islands form, with that of Frescas and the extensive bank running east and west of it, the northern boundary of the main entrance to the Amazon. They are low, wooded, and in the rainy season their savannas, covered with water, extend over a space of more than 70 miles. The northern shores can not be approached for a great distance from the extensive shoals which border them. The low south shore of Mexiana island, forming a slight southerly curve, is clear of danger, with deep water all along close to the mangroves which cover it.

The south shore of Caviana island is also clear of danger, with deep water, except a bank at the mouth of a river about 11 miles northwestward of Bossuti point, near its south extreme.

Cajetuba islet and Chaves village.—Cajetuba islet lies off the coast of Marajo, nearly abreast of the western extreme of Mexiana island, and at 4 miles westward of the village of Chaves. The village consists of about fifty houses.

Jurupari island and Remedios isle.—At about 15 miles NW. of San

Joaquin point, the NW. point of Marajo, is the NE. point of Jurupari island, with Pacas island between. The north shore of Jurupari runs WNW. for a distance of nearly 14 miles. In the middle of the channel, between its NW. end and the coast of Caviana, is Meio bank, with about one fathom water on it. At 18 miles westward of Jurupari is the small islet of Remedios, and from it a bank curves eastward nearly as far Jurupari, the whole forming the southern boundary of this part of the main entrance to the Amazon.

Directions.—Main entrance, Southern branch.—A small vessel from the eastward bound to the anchorage off the town of Macapa should make the land about cape Magoari with caution, and not approach it nearer than 5½ fathoms water; then run along the land to the westward in from 5½ to 11 fathoms, passing between Nova and Frecas islands. Then steer to the SW., southward of Jurua bank, toward a point which terminates abruptly, and remarkable by a small peak having the appearance of an island, on the coast of Marajo. From the point, steer for and along the south shore of Mexiana island.

In the middle of the channel, at about 8 miles eastward of the village of Chaves, is a ridge of rocks; its exact position is doubtful, but it is avoided by keeping Mexiana aboard, where the water is deep. At about 5 miles eastward of the west end of Mexiana is the little village of Nazareth, off which a vessel may anchor. From the west end of Mexiana, Caridad point, the SE. extreme of Caviana island, is seen. It may be approached close, and the island should be kept aboard to avoid the banks on the southwestern coast.

The bank at the mouth of the river, at 10 miles northwestward of Bossuti point, will be avoided by keeping 2½ miles from the shore; and by not going farther off a vessel will pass north of the Meio bank, lying southward of the west point of Caviana. When the meridian of this latter point is passed, steer about west for Pedrera point, which will soon be seen, and then close along the west shore of the mainland to avoid the strength of the current and the bank extending from Remedios islet to Jurupari island.

Anchorage.—There is anchorage in 6 or 7 fathoms NE. of Macapa fort, outside a ridge of rocks; small vessels anchor in the channel between the ridge and the main.

Above Macapa.—There are several routes from the anchorage off the town of Macapa up the Amazon, the best of which are the eastern one, which leads along the west shore of the islands of Porcos and Gurupa, and that westward of the Pará group. The latter is somewhat difficult, but is stated to have deep water in its navigable course. From the Nova islets to the Cajary islands the channel is deep, and a vessel can pass through the middle of the Cajary group or in the channel separating them from the mainland. From the Cajary group to the south point of Gurupa island, a distance of about 45 miles, the channel is clear, with deep water, and although considerably narrowed by Arruans island, its navigation is said to be easy.

At the south extreme of Gurupa island is the junction of the SE. arm of Pará river, which, with the upper waters, will be described.

Amazon, Eastern mouth, Pará river.—The estuary of the Pará river lies between Tijoca point on the east and cape Magoari on the west; it is about 34 miles in breadth, and from a position midway the coast on either side can not be seen. It is encumbered with numerous banks, and great attention to the lead is requisite. Considerable changes in the outlines of the coast near the entrance of the river have taken place since the survey by M. de Montravel in 1846, mostly through deposits from the rivers; banks formerly just showing at low water are now small islands covered with luxuriant vegetation. From this it would appear probable that there are many other shoals having less water than is shown in the chart.

The land on either side of the river is low, and the eastern shore is thickly wooded. The banks of the river are muddy, affording little facility for landing; and where they do admit of it, houses are generally erected. The water is extremely muddy, of a dingy orange brown.

Bragança bank, the most eastern of the group, is formed of hard sand ridges, on a bed of stiff mud; some of which, particularly those bordering Dentro channel, uncover at low water. The west and south sides of the bank uncover nearly its whole length at low water, and are steep-to; the north and east part forms a flat, over which there are from 3 to 6 fathoms water; the east side is steep and from it the water deepens suddenly from 5, to from 12 to 18 fathoms. As the bank lies in the usual passage for entering the river, and the sea breaks on the NW. side of it at all times of the tide, it is important to make the breakers, as they serve as a mark.

Lightvessel.—A lightvessel is moored in 15 fathoms about 1½ miles northward of the north side of Bragança shoal. The lightvessel is painted red, has two masts, and exhibits a *fixed* white light, visible from a distance of about 4 miles. The position of this vessel can not be depended upon, as she frequently drifts, and in stormy weather moves under the lee of the banks, and sometimes enters the river.

Pilots.—Fourteen men are engaged in the pilot service; they possess four schooners, one of which is always to be in the vicinity of Salinas bay. This schooner in the daytime, carries a white and red quartered flag, and at night, a white light at the mainmast. Occasionally, pilots are met with at the lightvessel, and also at Taïpu point. Too much confidence must not be placed in them. Pilotage is compulsory.

Buoy.—A large white buoy, visible from a distance of about 3 miles, is placed on the NE. side of Bragança bank.

No dependence must be placed on this or any buoys in the Pará river being in their proper position.

Foul ground.—Several vessels have grounded northeastward of Bragança lightvessel. Until a thorough survey of this locality is made mariners should use the charts with the greatest caution in approaching Pará river entrance.

Coroa Nova lies SSW. of Bragança bank, and is separated from it by Pozo channel of one mile in breadth, with depths of from 7 to 12 fathoms. The NE. part of this bank is continually changing its position, and the tide runs at the rate of 5 or 6 miles an hour. This shoal has extended some distance to the westward.

Coroa Gaivotas is a large bank of sand almost entirely uncovered at low water, and extends towards the coast bank, leaving between a narrow passage navigable for small craft. On it there is Gaivotas island covered with trees about 50 feet high. The Cassard channel between Coroa Nova and that of Gaivotas is winding, shallow, and not fit for any but very small vessels.

A lightvessel (*Gaivotas*) lies in about 6 fathoms water, with Taïpu point bearing S. 45° E. (S. 40° E. mag.), distant 5 miles, and exhibits a *fixed red* light, visible 7 miles. This vessel may be passed on either side.

Tijoca bank.—At about 2½ miles NW. of Bragança bank is that of Tijoca. It is composed of three hard sandy ridges, each about a mile in extent and 2 miles apart, with depths between of about 3½ fathoms of water. The northern ridge is named Cabeza do Norte; the center, Cabezo do Meio; and the southern, Cabeza do Sul.

Tijoca bank is steep-to all round, and Dentro channel, between it and Bragança bank, carries from 7 to 15 fathoms water. With any sea there is usually a strong ripple on this bank appearing like breakers, but this does not always occur.

Buoy.—A red conical buoy, with staff and vane, is moored on the south end of Tijoca bank, nearly one mile southward of Cabeza do Sul.

San Joào bank, with 3½ to 4½ fathoms, and 5 to 8 fathoms around, extends about SW. by W. and NE. by E. for about 3¼ miles. It is situated 5 miles westward of Tijoca bank, with 6½ to 8 fathoms water between.

Adonis banks are two dangers about 6 miles northward of San João, and separated from each other by a narrow channel having 5½ fathoms water. The eastern bank is about one mile in extent, with depths of 2¾ to 4½ fathoms. The western shoal is about 2 miles long, and has 2¼ to 3½ fathoms. There are depths of 6½ to 9 fathoms between these and Magoari bank at about 2 miles westward, and 5¼ to 12 fathoms between them and Tijoca bank, at 7 miles eastward.

Monjui bank lies about ENE., distant 3 miles, from Adonis banks. It extends ENE. and WSW., about 5 miles in length, and at its west end is rather more than one mile in breadth, from which it diminishes eastward. There are depths of 2½ to 5 fathoms water over it.

Magoari, or Santa Rosa, banks, forming the western group of banks in the entrance of the river, consists of a number of sandy ridges, and, although separated by a narrow channel, may be considered as part of the bank bordering cape Magoari, which, broken in places, continues along the coast of Marajo island until southward of Coroa isle. These ridges extend eastward from the cape for a distance of 14 miles, with a least depth of 1½ fathoms water, and on which, in fresh breezes, the sea often breaks; but at times their positions are not seen. From the eastern extremity of these banks cape Magoari is distinctly seen from the deck of a vessel.

Tide.—The flood tide here runs about WSW., and the ebb ENE.

Coroa Kiriri bank, southward of Magoari, borders the shore of Marajo island, from which it extends off to a distance of 16 miles, its eastern extreme being about 17½ miles in a WNW. direction from Tijoca point. It is said to uncover at low water springs, and shows generally in ordinary tides.

Dentro channel.—Bragança bank is separated from that of Tijoca by a passage about 2 miles in breadth carrying from 7 to 15 fathoms water, over fine gray sand, named the Dentro channel. It is always used for entering the Pará river, and notwithstanding the limited space for working to windward, by vessels of more than 15 feet draft in leaving

Monjui channel.—The passage between Tijoca and Magoari banks is named the north or Monjui channel, and is generally preferred for vessels under 15 feet draft in leaving.

Southward of Bragança bank is Pozo channel, now seldom used in consequence of its banks having altered, and the tide sweeping across them with great velocity. Cassard channel between Coroa Nova and Coroa Gàivotas is winding, shallow, and not fit for any but small vessels.

Western shore.—Marajo island.—The western shore of the Pará river from cape Magoari, in the island of Marajo, runs almost south as far as the parallel of Carmo point. It is low, woody, and intersected by the mouths of several streams, the principal of which is the Igarapé Grande, which is about a mile wide, and considered to be navigable for a great distance. The island supplies Pará with cattle and horses. In the rainy season it is much flooded. Almost all the streams on the eastern side of the island communicate with the lakes in the interior of the island, and the greater part are navigable for small vessels. At 1½ miles southward of the parallel of Carmo point is the village of Joannes, where the coast trends south-southwestward. At about 4 miles southward of Joannes is the village of Monsarras; and at 5 miles farther on, close to the coast, and on the parallel of Cocal point, is the low islet of Coroa Grande.

From this islet the coast continues for about 30 miles in the same direction, it then curves to the westward and trends WSW. for 24 miles to Goiabal light station. Nearly 20 miles southward of Coroa Grande islet is Mangabeira point, off which is Pombas island.

Light.—From a lighthouse on Joannes point is exhibited a *fixed* white light at an elevation of 40 feet above the water, visible in clear weather from a distance of 10 miles.

Coroa Morisoca.—From Coroa Kiriri the great bank bordering the shore of Marajo island trends to the southward for about 25 miles, where it is broken at 4 miles from the shore. This part of the bank, named the Morisoca, is dry in places, forming shallow, changeable channels through which the boats of the country pass; its southern part, Coroa Morro, is about 3 miles long, and from increased deposits has become an island, with stunted trees growing on it.

Coroa Secca.—At the distance of 6 miles southward of Coroa Morisoca is the north end of Coroa Secca, which extends to the southward for a distance of 5 miles, and is 2 miles in breadth. Its eastern edge is nearly midway between the two shores of the river. It is partly dry, and is extending to the eastward.

Buoy.—A red buoy marks the south extremity of Coroa Secca bank.

Coroa Grande.—This sandbank is partly uncovered, and extends 6½ miles from the coast between Coroa Secca and Coroa island, leaving between its east end and the south extremity of Coroa Secca a deep channel nearly 2 miles in breadth. These two latter banks are steep-to.

Eastern shore.—Taïpu point.—Between Tijoca point, the eastern entrance point of Pará river, and that of Topari, at about 6 miles to the SW., the coast forms a bay, cut by several rivers or channels which divide the land into numerous islands. Topari point is remarkable by three large trees which overtop the surrounding vegetation, and appear like hummocks. It may be said to form, with that of Taïpu point, 4 miles to the WSW., the estuary of the San Gaëtano river, where many tributary rivers also empty themselves. The Coroa Gaivotas, or San Gaëtano, extends as far as Taïpu point, covering the estuary of the river, where close to the entrance are two islets named Rasa and Ratos.

The land about Taïpu point is seen from a position to the northward of Bragança breakers, appearing like a low island, but on a nearer approach like two elevated hills, and joining the land to the SSW. Southward of these hills is a large tree, resembling a tower, near the north point of the mouth of the Fouro de Bareta. This tree is a good mark for Vigia channel, which is also easily known by its abrupt point appearing detached.

Correio bank, of hard sand, is dry in places during low spring tides, and on which occasionally the sea breaks heavily. It extends along the coast, from which it is partly separated by a narrow channel about ½ mile wide, from northward of the large tree just mentioned to the SE. of Carmo point. To clear it, keep Carmo point eastward of S. 5° E. (south mag.)

Vigia channel, formed by the island of Colares, is almost closed at the north entrance by Correio bank, which narrows its breadth to about 400 yards. The least depth through the channel is about 3 feet at low water, and in places there are 5 and 6 fathoms. The village of Vigia stands on the east side of the channel, at about 3 miles within the entrance.

Colares island is about 13 miles in length, 7 in breadth, and separated from the main by Vigia channel. It is more elevated than the land which precedes it to the north. Carmo point, the NW. extreme, appears perpendicular, caused by the trees on it, which have their roots in the water. At 6½ miles southward of it is the village of Colares, with a white chapel, standing upon a flat sandy shore, sheltered from the sea by a ridge of rocks, uncovered at half tide, and which form a breakwater for a distance of 1½ miles from the shore. At 5½ miles southward of the village is Cocal point, where the shore turns abruptly to the eastward. This part of the coast is skirted by several ridges of rocks.

Light.—On Colares rocks stands a lighthouse, from which, at an elevation of 39 feet above high water, is exhibited a *fixed* white light, visible in clear weather from a distance of about 12 miles.

The lighthouse and the keeper's dwelling near it are painted white.

Bay do Sul.—Cocal point forms the north extremity of a large and deep bay, named the bay do Sul, which is joined on the north by Vigia channel, and on the south by the San Antonio river. The entrance is partly filled by a large ridge of sand, which is dry in places, and extends from the distance of about ½ mile southward of Cocal point to within ½ mile of the south shore of the bay. When the parallel of the village of Colares is passed, the south coast of the bay do Sul is seen, which terminates on the west by Marau point.

Pombas isle.—At about 4 miles eastward from Marau point, and close to the shore, forming the south side of entrance to the bay do Sul, is Pombas isle, round, woody, and at first appearing attached to the mainland. A ridge of rocks extends to the northward from the isle for the distance of nearly a mile, and along the shore to the eastward, leaving between them and the ridge of sand extending from Cocal point, a narrow channel into the bay. The sea is here sometimes rough, especially with the flood tide.

Guarabas island.—At the distance of ½ mile from Marau point is Guarabas island, low, and covered with brushwood. It is steep-to, with a clear narrow channel of 10 fathoms between it and the main. The coast from Marau point trends southwestward, and at the distance of about 4½ miles is Chapeo Virado point, where it trends to the southward for 3 miles to Musqueiro point, and then southeastward, forming with Barreiras island, to the south, San Antonio bay.

Tanheiras rocks.—Between Marau and Chapeo Virado points, at about ½ mile from the shore, are Tanheiras rocks consisting of several ledges covered at high water, with shallow depths extending a mile to the westward of them. These are dangerous, and should be carefully avoided.

Light.—Chapeo Virado light is shown from the outer extreme of the shoal SW. of the point. The light is *fixed red*, elevated 36 feet and visible in clear weather from a distance of 13 miles.

For description of upper river see page 87.

Channel to Pará.—The entrance of the navigable channel leading to the town of Pará is between the shoal off Musqueiro point on the east, and those extending from Tatuoca islet on the west, and is 1½ miles in breadth. The least depth to the town is 3 fathoms.

Tatuoca, a wooded islet, lies 3 miles southwestward of Musqueiro point, and is the northernmost of a group of islands extending along the coast of the mainland over a distance of 20 miles, and forms the western side of the channel. From the islet, a ledge of rocks extends to the northward to the distance of nearly 1½ miles, some of which uncover at low water. Adjoining the south part of the islet is the extremity of a hard sandbank, which extends northward from Jetuba island and partly dries at low water springs.

Musqueiro point, Magari river.—At about ½ mile westward of Musqueiro point, on which there is a red tiled factory, is a shoal with 1½ fathoms water, and 7 fathoms between it and the point. From Musqueiro point a bank of sand extends across San Antonio bay to the SW. end of Barreiras island, at the entrance to Magari river or channel. There is a factory and an iron pier on both the points of entrance to Magari river. From Pinheiro, the south point of entrance, the coast trends southward as far as the town of Pará. At the distance of 400 yards from the chapel on Pinheiro point is a rock with 11 feet at low water, and a depth of 6 fathoms between the rock and the point. About midway between Pinheiro point and Tapaca, at 1¾ miles south of it, there is a shoal, from which a church near the customhouse at Pará is seen open eastward of Nova island and a brick kiln at Tapaca bears S. 64° E. (S. 59° E. mag.), distant about 800 yards. Being southward of Pinheiro point, the towers of the principal churches of the town are seen, and soon after the other buildings.

Nova island.—Southward of Pinheiro point the navigable part of the channel to Pará is contracted on the west side by Nova island and the island and mud banks extending from it parallel to the shore, and the east side by the banks which more or less border the shore at a short distance.

Fort da Barra.—At ¾ mile SE. of Nova island is the isolated and circular fort da Barra, nearly 400 yards from the shore. From 4 to 11 fathoms will be found in the channel between Musqueiro point and fort da Bara. A small fixed light is shown from the fort.

Rocks.—At about ¼ mile north of fort da Barra is a rock with about 6 feet on it, and which, being near the channel, must be carefully avoided.

At about one mile S. 12° W. (S. 17° W. mag.) of fort da Barra, and about ¼ mile from the shore, near the brick-kiln of Val de Caës, is a rock having 9 feet water. The rock is steep-to, and between it and the shore there is a depth of 6 or 7 fathoms.

Also a small rock, visible at low water, lies S. 52° W. (S. 57° W.

mag.) of Penacova chapel, at about 400 yards from the shore, with from 5 to 6 fathoms inside the rock.

Red buoys mark the outer edge of a sandbank with 9 feet on it, off Penacova chapel. None of these buoys are to be depended on.

Oncas island.—Southward of fort da Barra the channel appears to widen, and here, at a distance of 2 miles from the mainland, is the northern extremity of Oncas island, which extends to the southward past the town of Pará. The space between the island and the main is divided into two channels by the narrow bank of mud which extends to the southward from Nova island past the town of Pará. This bank has from about 3 to 12 feet water over it. The coast of the mainland continues to be bordered more or less by a bank.

Pará, or Belem, the capital of the province of Grand Pará, stands on an elevated point of land on the right bank of the estuary of Pará, about 70 miles from its entrance. The city is regularly built and well lighted; the majority of the streets are macadamized and kept in good repair. The houses, with their whitened walls and red tiled roofs, are substantially built of stone; few, however, have more than two stories, and many of them only one.

There are public squares, a palace for the President, several churches, a hospital, marine and military arsenals, theater, botanical garden, etc. The Estrada das Monguberias (the Monguba road,) about a mile long, extends from near the naval arsenal, on the river side, to the Largo da Polvora at the eastern extremity of the city. It is a magnificent avenue of silk cotton trees, and it is intersected by avenues leading from the palace yard and the Largo do Quartel.

The naval arsenal has some fine buildings, but appears to be only used for the small squadron employed on the Amazon. Frigates have been built here; wood material is plentiful, and of the best description.

Beyond the actual precincts of the city a dense forest commences. The climate of Pará, though hot and liable to thunder storms and heavy rains, is healthy for Europeans. The ground is of a porous nature, and soon dries after the heavy rains. A large proportion of the population is composed of Portuguese, and there are a few English, Germans, and Americans. The native population consists principally of Tapuias or Indians, and mixed races. The interior of the province may be considered as inhabited entirely by Indians. Population, 60,000.

The sanitary condition of the port is good. The marine hospital is well kept.

The United States is represented by a consul and vice-consul.

Supplies, such as provisions are generally high; beef, about 11 cents per pound; pilotbread, 6 cents. Water is generally taken from the river; there are no lighters, but good water can be supplied in pipes at from 40 to 60 cents per pipe, hire of pipes extra.

The water of the river is good during a part of the year, but unwholesome and dangerous to drink in the months of July, August, and

September. When taken from alongside the water soon settles, leaving 2 or 3 inches of sediment in each tank, but it will not long keep good.

Coal.—From 4,000 to 5,000 tons of coal are kept in stock at Pará. Coaling is by lighters and small baskets, and about 100 tons are usually put on board per day. To coal with dispatch, all labor would have to be provided by the vessel requiring it. Very little interruption.

Pilotage on steamers is 3 cents per ton gross, on sailing vessels 6 cents per ton gross. Pilotage is compulsory.

Port charges.—Light dues up to 200 tons, $8; 400 tons, $12; 700 tons, $16, and over 700 tons, $20. Hospital dues, 13 cents each man, and for the hull $1.25. Customhouse pass (stamps), $1.40. Captain of the port (stamps), 30 cents; Brazilian bill of health, 50 cents. Customhouse dock dues (according to length of lighter), 4 cents per foot. State tax for vessels up to 400 tons, $3; over 400 tons, $5; police pass, $1.50.

Gridiron.—There is a gridiron for cleaning ships' bottoms, capable of taking a vessel of 600 tons and drawing 7 feet water.* At the Una river, 2 miles north of the town, there is a convenient place for heaving a vessel down.

Communication between Pará and the other ports of the Republic is kept up by steamers, three times monthly, belonging to a company at Rio de Janeiro, which receive a large subvention from the Government. A line of steamers between New York and Rio de Janeiro calls at Pará twice a month. There are also two regular monthly lines of steamers from Havre and Liverpool.

Other companies, having in all about 32 steamers, varying from 20 to 600 tons, are established for the purpose of the Amazon river traffic, of which the principal station is Pará. These steamers, with numerous small craft and canoes, may be considered the only means of communicating with the interior.

Submarine telegraph.—Pará is connected with Pernambuco by submarine telegraph; and most of the principal ports on the east coast of Brazil are connected in the same manner. A red buoy placed off Penacova marks the position of the cable.

Lights.—A small *fixed* light, established by the Amazon Steamship Company is situated on the SW. point of Coutejuba island, and another on fort da Barra, in the channel to Pará, visible about 7 miles. Too much reliance must not be placed in these, or other lights on this coast.

Anchorages.—The anchorage of the town of Pará is in from 2 to 3½ fathoms, distant about ½ mile, between the church of San Antonio at the north end, and that of Merces near the center of the town. Vessels should moor.

There is good temporary anchorage off bay do Sul, in from 5 to 7 fathoms, with Pombas island bearing S. 5° E. (south mag.); also off

---

* The river is infested with rats and precaution should be taken against their getting on board ship.

Musqueiro point, in from 3½ to 5 fathoms, with that point bearing about N. 6° E. (N. 11° E. mag).

Tides.—It is high water, full and change, in the Dentro channel at 10h. 50m. Springs rise 10 feet; the flood sets to the SW. from 2½ to 3¼ miles an hour; the ebb sets to the NE. at the same rate. At Pará anchorage, at 12h.; and at Onças island, at 1h. 20m.; springs rise 11 feet. The flood tide runs at from 2¾ to 3½ miles an hour; that of the ebb from 2½ to 3¼ miles. In winter, whilst the winds blow from the north, the flood lasts longer than the ebb, and runs with greater strength; but during the rest of the year the ebb tides last longer, and are more rapid than the flood.

The difference of level is caused by the influence of the waters of the Guama and Guajara. The time of high water, and the strength of the tide, however, vary according to the force and direction of the wind and the quantity of rain that falls in the upper part of the rivers.*

Winds.—In the summer the mornings are generally calm, or a light breeze blows from east to ENE., and by degrees veers to the northward; in the afternoon it blows from NE. to NNE., and often fresh until 5 or 6 p. m.; it then falls calm, which lasts till the morning. In winter the breezes are irregular, and during the rainy season there are light squalls and calms. These squalls are variable, blowing from north to south. When at this season the regular breezes set in for a time, the weather improves also, and is fine during their continuance. The temperature varies between 70° and 90° Fahrenheit; it rarely descends lower or rises higher than these two limits. Probably there are few places where so much rain falls annually as at this town.

Directions for entering the river.—Having obtained a pilot from the pilot schooner off Salinas, steer to the northward until in 11 fathoms of water, and then N. 84° W. (N. 79° W. mag.) along the coast in from 10 to 14 fathoms water making due allowance for the tide, and passing about 6 miles north of Cajetuba point. When on the meridian of Curuça point the breakers on the Bragança bank will be seen bearing about S. 74° W. (S. 79° W. mag.), distant about 7 miles. Bearings now taken of the east extreme of Cajetuba and the west part of Tijoca point to the SW. will determine the vessel's position and show the effect of the tide, for which on the flood a point to the north shall be steered.

If the vessel's position be satisfactory, the course N. 84° W. (N. 79° W. mag.) may be continued to be made good, in not less than 8 fathoms water, which will be found northeastward of the flat extending N. 63° E. (N. 68° E. mag.) from the Bragança, and which will increase to 10 fathoms north of it.† When abreast the position of the large white buoy off the NE. side of Bragança bank, or when Tijoca point bears S. 5° E. (south mag.), steer round the breakers, in from 12 to 15 fathoms through Dentro channel, until Espadon sandbank or breaker is in line with Tijoca point, bearing S. 44° E. (S. 39° E. mag.); then steer S. 37° W. (S. 42° W. mag.), which will carry a vessel westward of the Coroa Nova and of all dangers.

---

* It has been said to attain at times a velocity of 7 knots an hour.

† Too much dependence must not be placed in the depths of water, which are subject to constant change.

If the breakers on Bragança bank are not seen in consequence of a calm, high water, or the sun being too low in the horizon, great caution must be exercised in approaching it; and when in Dentro channel, if the vessel should be in less than 9 fathoms, the land of Tijoca being distant, and the islets of Rasa and Ratos out of sight, the vessel will be too far westward, near the Tijoca bank, and a more southerly course should be taken until Tijoca point bears eastward of S. 50 E. (S. 45° E. mag.). If those islets are in sight and well open, bearing westward of S. 5° E. (south mag.), with the land of Tijoca very distinct, and the depth decreasing, a vessel will be too near the edge of Bragança bank, and should steer more to the westward.

The above directions are given as the Bragança lightvessel is often out of her place, but assuming her to be in the correct position, when she is sighted keep her on a S. 85° W. (west mag.) bearing, and passing north of her, steer S. 40° W. (S. 45° W. mag.) as soon as she is rounded. Great attention must be paid to the tides, as in Dentro channel the ebb sets towards Bragança bank and the flood from it.

It would not be prudent for a vessel to enter this channel during night or in a calm. It would be better to anchor before reaching it, even at the risk of losing on anchor. The bottom is everywhere fine gray sand.

Assuming the vessel to pass in the center of Dentro channel and about ¼ mile from the Espadon breakers, a course S. 37° W. (S. 42° W. mag.) will, guided by the chart and lead, lead about one mile clear of all danger. If the soundings, before reaching bay do Sul, exceed 8 fathoms, the vessel will be too far westward. Southward of the bay the water deepens.

Do not bring Guarabas islet to bear northward of N. 57° E. (N. 62° E. mag.) until Musqueiro point bears S. 16° E. (S. 11° E. mag.) when the reef extending from Tanheiras rocks will have been passed. Then steer so as to give Musqueiro point a berth of one mile, passing eastward of Tatuoca isle and the dangerous shoals lying north of it, and then S. 6° W. (S. 11° W. mag.) for Pinheiro point, on which there is a factory, making allowance for wind and tide. Having passed Pinheiro point at the distance of ½ mile, keep along the coast for the passage between Nova islands and fort da Barra, passing about 300 yards westward of the latter, and avoiding the rock ¼ mile north of it. From fort da Barra steer towards the western part of the town, passing 100 yards outside the red buoys, if in position, or at ½ mile off the shore. If the wind be light, care must be taken to guard against the flood tide, which sets strong to the SW. between the Una river and the point of the town.

The mark for being near the edge of the bank, extending from Nova islands to the anchorage, is the west angle of the hospital, a white house standing in the west part of the town, in line with the church of Carmes, in the SW. part of it. Anchor off the town as before directed.

Directions for leaving the river.—A vessel leaving the anchorage of Pará should be under way at high water, and if of large draft may stand to the westward into 4½ fathoms water, or until the hospital and church of Carmes are in line; but into 3½ fathoms if of light draft; and to the eastward as far as a line joining the cathedral and fort da Barra. When the north part of Arapiranga island is seen between Miriam and the island southward of it, a vessel will be northward of the bank extending north from Nova islands, and may stand towards the islands into 4½ or 5 fathoms.

A vessel will thus probably arrive as far as Musqueiro point before the flood makes, and if the parallel of Pombas islet, where there is anchorage, can also be reached, proceed on; but if not, it will be better to anchor southward of the point, to prevent doing so farther north in deep water, rocky bottom, and in the full strength of the flood tide. Between Musqueiro and Marau points, a vessel may stand across to the westward, till on the meridian of the west part of Coutejuba island.

The depths will be from 10½ to 15 fathoms, and when they decrease to 11 fathoms, tack, and stand eastward into 9 fathoms. The lead is not a guide when standing towards Coroa Grande or Coroa Secca, as the water is deep, and the banks are steep-to, but they will probably be seen; between the parallels of Marau and Cocal points, vessels should not stand westward of the meridian of Chapeo Virado point; and when north of Cocal point, tack short of the meridian of Marau point. In standing to the eastward the lead will be a sufficient guide, tacking at a prudent distance from the shore.

From the anchorage off Musqueiro point the second ebb will probably take a vessel north of Colares village, where she may anchor in a convenient depth, with a muddy bottom, between that village and Carmo point. The third ebb tide will probably carry a vessel to Gaivotas island, during which stand westward to a prudent distance, and eastward into not less than 5 fathoms; but tack short of the meridian of Carno point, until well northward of Correio bank.

To sail out by Dentro channel, it is necessary to have daylight, and to be under way at high water. A vessel when standing to the NW. should not lose sight of Tijoca point. In standing eastward, whilst Tijoca point bears eastward of S. 84° E. (S. 79° E. mag.), keep Taïpu point eastward of S. 16° E. (S. 11° E. mag.), or do not open of each other the two small islets of Rasa and Ratos. Bearings of Tijoca and Taïpu points will assist in clearing Coroa Nova and Cabeza do Sul, should the buoys be adrift.

Short tacks should now be made through the Dentro channel, standing towards Tijoca bank into 7 fathoms, and to Bragança bank to the distance of about ½ mile from the breakers, bearing in mind that the ebb tide sets towards the Bragança. It often happens that a vessel does not get through in one tide; in this case, anchor in 7 or 8 fathoms water on the west side of the channel. Care must be taken not to stand too near the NE. extreme of Bragança bank; the soundings in the stream of the channel will be from 12 to 15 fathoms.

The shoals and foul ground northeastward and eastward of Dentro channel have been previously described, and must be carefully avoided.

The North, or Manjui, channel is generally used by vessels drawing less than 15 feet; the only danger for those of about that draft being Adonis banks, on the west side of the channel. Having worked out of the river as far as the anchorage abreast Gaivotas island, about 4 miles N. 39° W. (N. 34° W. mag.) of Taïpu point, a vessel must leave that position at high water, and steering about N. 16° W. (N. 11° W. mag.) will, with the ebb tide running NE. at 2 miles an hour, make good about a N. 5° W. (north mag.) course. Having lost sight of land, should the soundings decrease from 5 to 8 fathoms to 3½ fathoms, a vessel will probably be on Monjui bank, when she should steer more to the westward till the water again deepens.

If the wind will not admit of the vessel heading N. 16° W. (N. 11° W. mag.) on leaving the anchorage NW. of Taïpu point, she may pass over the San Joáo banks, where the depths are not less than 3½ fathoms at low water, and therefore at nearly high water are not dangerous. A vessel navigating this part of the entrance to the Pará with a strong working wind, can not be guided by any positive marks, being out of sight of land, and the soundings not indicating the approach to the banks.

By keeping on the east side of the channel, but not eastward of the west part of Taïpu point, bearing S. 6° W. (S. 11° W. mag.), a vessel will be clear of danger. With cape Magoari in sight from the masthead, and if in 2½ fathoms water, a vessel will be on the Adonis banks, and should make a short tack to the eastward; and if the cape be sighted from the deck when in 5½ fathoms, the vessel will be too far westward. As a rule, when the cape is distinctly seen from the deck, a vessel will be too near the Magoari, or Santa Rosa, banks.

The soundings over Monjui bank will indicate the vessel's position; and, after passing it, the bottom, which has hitherto been of gray sand, is soft mud. If there be but little wind, and the ebb tide nearly done, it will be prudent to anchor on this muddy bottom, to prevent being carried westward by the flood; but with a fresh breeze stand to the northward, unless the soundings decrease to less than 7 fathoms.

Route to the Eastward.—The general route to the eastward is close inshore, out of the influence of the westerly current, and by taking advantage of the current, tide, and every slant of wind a sailing vessel will generally perform the voyage from Pará to Pernambuco in about 30 days. During the prevalence of ENE. and NE. winds a current sets ESE. along and near the north coast of Brazil; this fact is well known to the masters of the coasting craft and is taken advantage of by them. When the weather will admit, a vessel may anchor off any part of the coast without danger. In working along shore, the dry season is considered preferable, as the winds are then fresh and steady. Stand off during the day, and in towards the land at night, so as to be near the coast in the morning, to take advantage of the land wind, by which a good sailing vessel will make from 40 to 50 miles a day.

In the rainy season working to the windward is more tedious, as calms, light variable winds, squalls, and rain prevail; a vessel should then stand on the tack that is most favorable, and as a general rule should not go outside 30 fathoms water, and in towards the land to a prudent distance. From Pará eastward as far as the Pernaibão, or Paranahiba there are numerous rivers along the coast, and in getting in with the land attention should be paid to their streams. Should the wind be steady, tack as in the dry season, but do not lose sight of the coast.

Having arrived so far eastward as Mel point, about 15 miles eastward of rio Mossoro, and failing to get farther to windward, a large vessel should stand direct to the northward for about 80 miles, or until well able to weather the NE. extreme of the continent on the port tack. A small vessel may go inside the shoals of St. Roque, where she may anchor at night, and although there is not room to work through Santo Alberto channel, the water is smooth and advantage may be taken of the land wind in the morning. No difficulty will be experienced in obtaining a pilot in the vicinity of cape St. Roque or the villages westward for the inshore channels.

Should, however, the mariner prefer standing direct to the northward from Pará, across the equator, into about about 10° N. and then tack, he will save wear of men, sails, and rigging, and will probably perform the voyage to Pernambuco in about the same time.

Route up the Amazon, south of Marajo island.—The route taken by vessels ascending the Amazon is that leading from the Pará river, or eastern branch, south of Marajo island, through Goiabal and Breves passes, a description of which will now be given.

Lights.—In addition to the lights already described lights have been established by the Amazon Steamship Company, at the following positions, viz: At the entrance to Guajara river, abreast of the south point of Oncas island; south of Pará, on Capim island; at Goiabal village; at Panacuera, opposite to Goiabal, at the entrance to Tocantins river; and on Jutahy island, entrance to Breves pass. These lights are *fixed* and visible about 7 miles.

Goiabal pass.—Westward of the town of Pará and of Oncas island is the main branch of the Pará river leading to Tocantins river, and by Goiabal pass, northward of Tocantins, to the Amazon.

Between Arapiranga (northward of Oncas island) and Goiabal the channel is from 5 to 8 miles wide and clear of danger beyond ½ mile from the shore.

The Goiabal islands are separated from the SE. shore of Marajo by a narrow channel named Goiabal pass, in which the depths are from 5 to 15 fathoms; the islands are connected together and to the mainland and to the southward by an extensive sandbank, which also partly covers the mouth of the Tocantins. A bank extends a good mile eastward of Jauaroca, the eastern of the Goiabal islands, between which and the bank extending off the light the channel is reduced to about ½ mile in width, and is further reduced to the westward, between Murumuru and Jararaca islands.

Shoal.—A shoal, which dries at low water for a distance of about 500 yards east and west, steep-to on the northern side, with shoal ground extending about ¾ mile westward and a greater distance southward from the dry part, is situated with Goiabal lighthouse bearing S. 85° W. (west mag.), distant 3$\frac{1}{10}$ miles from the part which dries.

Rio Tocantins.—This river enters the eastern or Pará mouth about 40 miles SW. of the town of Pará, and opposite to Goiabal pass.

Having passed Panacuera light, course must be shaped to pass between the two western of three islands lying off the east bank near the entrance of the river, and between the two other islands south of them toward the east bank of the river, along which continue for about 18 miles in not less than 4½ fathoms water (but generally in 7 and 8); then strike across SW. to Cametá on the opposite bank, and anchor about 300 yards off the town, in 8 fathoms water. The Tocantins becomes unnavigable, except for boats, at 120 miles above Cametá, where the first rapids commence.

The land being low and thickly wooded, its general appearance is so uniform that it is difficult to distinguish one particular part from another; it is therefore desirable to obtain a pilot, but there are few who can be trusted to take charge of a vessel drawing more than 6 feet water, excepting those employed by the Amazon Company.

Cametá, 90 miles from Pará, although containing only about 3,000 inhabitants, is an important town, as the whole trade of 1,600 miles of river passes through it, the produce being brought down from the interior in small schooners and native boats. Communication is maintained with Pará by steamers. Cametá is healthy except in the rainy season (December and January), when fever and ague prevail; the town is dry, the river bank here being 20 feet high, and the soil composed of red clay and sand; deep water runs close to the shore, and there is every facility for the construction of wharves. The water of the river at Cametá is good and fit to drink. Supplies can be obtained, beef about 12 cents a pound. The principal article cultivated is cacao, which appears to grow almost wild; rubber is brought in from the country.

Tide.—The rise of the tide is 9 feet, and the velocity of the current about 2½ miles an hour.

Breves pass.—Westward of Goiabal pass the channel expands to a breadth of 2 to 4 miles, and maintains this breadth for about 65 miles, to the entrance to Breves pass, 16 miles east of Breves village, when it narrows to about ¼ mile; but between Goiabal and Breves the channel has not less than 5 fathoms, and in some places has as much as 18 fathoms.

There is a light on Jutahy island about midway between Goiabal and Breves, and on the south side of the channel. A shoal extends about ½ mile south of Corralinho village on the northern shore, 6 miles east of Jutahy island.

On both sides of the river are inlets cutting the coast into numerous islands. The whole country on both sides is a forest.

From the south point of entrance to Breves pass a bank stretches to the eastward for a distance of 7 miles, and 2½ miles within its extremity is Oia islet. The shore on the north side of entrance is also fronted by a bank.

Breves.—The village of Breves is on the north bank and distant about 150 miles from Pará. It is the center of the india rubber trade. The flood tide runs for 3 hours, has a velocity of half a knot, and rises 6 feet.

Aturia and Oleria passes.—At 13 miles above Breves the channel divides; the Aturia or Northern pass, with an average width of 38 yards, is used only by vessels ascending the river. Near Aturia point there is a bar with a depth of 4 fathoms at high water. Oleria, the Southern pass, has an average width of 70 yards and is used only by vessels descending the river. These passes meet at Aturia point The Macacos and Jabura passes, which run to the northward and communicate with the Amazon northward of Limao pass, as well as several others from the southward, communicate with the main channel near the eastern junction of Aturia and Oleria passes.

The flood tide does not overcome the current above Aturia point, while the Jabura and Macacos are subject to the regular tides.

Limao pass.—From Aturia point the channel increases its breadth to about 600 yards, and takes a general northerly direction for about 19 miles to Mutum-coara island and passing southward of it, thence it continues westward for 17 miles under the name of Limao pass, to the west end of Curuma island on the northern bank; here the channel strikes against Ituquara island and takes its name, turning sharply WSW., and, with a breadth of a ½ mile, continues for a distance of 10 miles to Vieira point, the west end of Ituquara island, where it enters the Vieira branch of the Amazon, which passes eastward of San Salvador island.

A shoal extends about ¼ of a mile to the southward from Vieira point.

Vieira branch.—From Vieira point the Vieira branch (ascending the Amazon) trends southward for 33 miles, to Gurupá village on the south bank, with an average breadth of about one mile. Southward of Vieira point the eastern shore should be kept aboard until nearly abreast of Areias village; westward of the Marajo river the south shore should be kept as far as Gurupá.

Gurupá branch—The village of Gurupá stands on a rocky bank 34 feet above the sea level. Abreast the village and running from seaward, along the western side of San Salvador island, the Gurupá branch joins the Vieira, and 15 miles further to the westward by the Xingu river from the southward, the first of the great tributaries of the Amazon, and 1,200 miles in length, thence it turns northwestward between Gurupá and Baxio Grande and joins the Amazon (main) river.

A bank extends about one mile SW. of San Salvador island, at the junction of the Vieira and Gurupá branches, but in mid-channel in both branches there is deep water.

There is good anchorage southward of Jarinta point, the west extreme of Gurupá island, between that island and Baxio Grande.

Amazon river.—From the junction of the Gurupa branch with the Amazon main stream, its course (ascending the river) takes a WSW. direction for a distance of nearly 60 miles, past the Pesquiero, Velha Pobre, and Jurupary islands, which islands may be passed on either side. The north channel is narrow and deep, and the stream runs strong. It is avoided by boats ascending the river, but is frequented by those descending. Opposite the junction, on the northern bank, is Velhas island, followed by that of Comandahy, from whence the serra Jutahy will be seen, and which commence near the north bank at the village Almeirim. Morro Velha Pobre rises almost vertically from the bank of the river abreast of Jurupary island, and is nearly 1,000 feet high. The water is deep in all this portion.

Paracoara island—Prainha village.—From morro Velha Pobre to Paracoara island the river is wide and deep, but it narrows at Paracoara island to 2½ miles; the depth increases in places to nearly 30 fathoms, and the current becomes very strong till the village of Prainha is passed, at about 40 miles westward of Velha Pobre, when the river begins to widen. Between Paracoara island and Prainha village are the Acara-assu, Itanda, and Itanduba islands, the approaches to which are clear, but near them the current runs very strong.

From Prainha to mont Alégre island the river is clear from one bank to the other, with a wide and deep channel.

The village of Prainha has about 300 inhabitants, and exports cattle and cacao. The serra Urubucoara lies about 4 miles west of the village.

From Prainha to the sea the rise and fall of the tide increases rapidly from 3 feet to the maximum.

Mont Alégre and Freixal island.—Westward of Prainha the course of the river is about WSW. to Freixal island, a distance of 30 miles, abreast of which on the north shore is mont Algére and village. About 10 miles west of that mount are the serras Erere and Paytuna, with lake Mont Algére at the foot. This lake is one of the largest in the vicinity of the river, and has an abundance of fish. In the rainy seasons it fills a large space, bounded on the south and east by the river, on the north by the serra Tawari, and on the west by the Tapará river. There is a channel of deep water on either side of Freixal island, from whence the river trends to the southward for 20 miles to Sitio do Torou point abreast of which, to the eastward, is Curua island, river, and sierras. The shore within 4 miles on either side of Sitio do Torou point is foul for the distance of 400 yards off shore, and must be avoided. The usual channel going down, from Sitio do Torou point, is near the north bank as far as Acara-assu island, then cross and keep on the south bank as far as its junction with the Gurupá branch.

Santarem.—From Sitio do Torou point the trend of the river is nearly west to the entrance to Tapajos river, a distance of 37 miles, and where on the south bank is the town of Santarem. A berth should be given to Negra point, the north point of entrance, off which a shoal extends some distance.

Rio Tapajos takes its rise about 150 miles to the westward of the Xingu, and enters the Amazon in longitude 54° 40′ W. It affords a communication with the Brazilian province of Matto Grosso.

Santarem carries on a considerable trade with the inhabitants of Matto Grosso. This river is navigable for steamers for about 170 miles above Santarem, when impassable rapids are met with; above these boats can go to within a short distance of Diamantino, which is about 100 miles north of Cuyaba, the capital of Matto Grosso.

Marimarituba islands.—Above the mouth of the Tapajos the river runs northwestward about 20 miles as far as the west end of Maracas island, beyond which a bank stretches northwestward from the island, about one mile, and nearly joining the bank extending from Paricatuba island, where it turns to the west and SW. past Paricatuba island as far as the south extreme of Marimarituba, a distance of 12 miles. The channel between Paricatuba and the south shore is dangerous and liable to change. From the south end of Marimarituba island, abreast of which is Sita de Piza village, the channel takes a northwesterly direction for 35 miles to Obidos, south of Meio and Mamauru islands, and where the current acquires great strength. The channel is apparently free from danger.

Lago Grande.—Between Santarem and Obidos the banks are low, and in the rainy season are almost completely under water. The south bank of the channel, abreast of Marimarituba island alone has a steep shore, and is about 150 feet high, bounding Lago Grande on the NE., which extends from Villafranca on the Tapajos as far west as Obidos. Lago Grande communicates with the Tapajos by a channel near Villafranca, and with the river by several openings west of Marimarituba, and by one west of Obidos. It is full of fish, and said to be navigable in a greater part of its extent.

Obidos.—The town of Obidos, with about 500 inhabitants, about 520 miles by the course of the river from Pará, stands on a bluff about 56 feet high, overlooking the river, and connected with a line of hills to the northward. This is the extreme point at which the tide is felt. There is a strong eddy close off the town near the bank fringing the shore.

Villa Bella.—From Obidos the river trends for 30 miles to Bom Jardin island, on either side of which there is a channel; from thence the river takes a general SW. direction past Maraca-assu, Caldeiroes, and Parintins islands for about 60 miles to Villa Bella.

The main channel is north of Maraca-assu island and east of that of Caldeiroes. There is also a deep channel westward of the latter island, off which a bank extends one mile southward from its southern point. Eastward and southward of Caldeiroes island, on the eastern bank, are two groups of hills, known as the serra dos Parintins, about 500 feet in height. The southern group forms the boundary between the province of Amazonas and Grand Pará.

Villa Bella has 400 inhabitants and exports cacao.

Serpa.—From Villa Bella the river takes a west direction for 20 miles, where the banks open out in the form of a circle nearly 10 miles across. In this portion are Pacoval and Oncas islands. The channel south of these islands is the widest, but that to the northward, named Pacoval, is usually taken by steamers. Westward of these islands the river is again reduced to a breadth of about 2 miles, taking a NW. direction for 10 miles, whence it turns sharply to the SW., with numerous islands, to Serpa, distance from Villa Bella about 135 miles. The current south of Grand Serpa island runs about 3 knots an hour.

Serpa has 700 inhabitants and a customhouse.

From Serpa the river takes a SW. direction to the entrance to Madeira river, a distance of 24 miles, with a channel on either side of Trinidade island; thence the general direction is about west to Manaos, at the entrance to rio Negro, which here joins the Amazon from the northwestward, distant 107 miles from Serpa. A bank extends ½ a mile or more off the south side of Trinidade island, the deep water about 9 fathoms, being near the southern shore.

About 13 miles east of Manaos a ledge of rocks, named the Morona, extends one mile off the northern bank, leaving only a narrow channel between them and Marona island, and which requires caution in passing it.

Rio Madeira is a most important tributary of the Amazon. It takes its rise near the city of Chuquisaca, in latitude 19° S., longitude 65° W., and flows into the Amazon in longitude 58° 46′ W. The tributaries of the Madeira are very numerous, and drain a large extent of country. For about 550 miles from its mouth, or as far as San Antonio, the navigation of the Madeira is easy. The survey conducted by Commander Thomas O. Selfridge, U. S. Navy, has demonstrated that it is possible for vessels drawing 16 feet water to pass during nine months of the year, and by careful navigation, during the whole year, from Pará directly to San Antonio.

A channel for vessels drawing from 6 to 8 feet is always practicable.

Merchant vessels of all nations are permitted to ascend the Madeira as far as San Antonio, the current in which is not more than 1½ miles an hour.

A railway was projected and undertaken in 1878 to connect Bolivia with San Antonio, by which means the trade of this branch would be immensely increased.

At San Antonio the difference between high and low river is 51 feet. The rainy season commences in October and ends in April, the Madeira being at its highest point about the latter month.

At San Antonio there commences a series of impassable rapids and waterfalls 230 miles long. A little above the rapids the Madeira separates into two branches, one, named the Guaporé, taking a southeasterly direction, and the other, the Mamore, the most important, a southwesterly direction.

From Guarajá up the Mamore the navigation is easy and clear, and in most places admits of navigation by vessels of 12 feet draft. The current runs at the rate of from one to 1½ miles an hour. Steamers of small draft can ascend the Guaporé as far as Villa Bella de Matto Grosso. The rich forests on the banks of the Madeira attract a large population from the upper Bolivian provinces in quest of India rubber and other products.

Amazon.—Marañon.—The Amazon from its junction with the rio Negro takes a westerly direction to about 65° W., where it is joined by the Japura from the northward. Westward of this junction the river is known as the Marañon, and it is said to be navigable for light-draft steamers to Borja, in latitude about 4½° S., longitude 77½° W.

Directions.—Pará to Manaos.—The uniform aspect of the banks of the Amazon, the resemblance between the islands and the various points along its course, and the absence of objects of recognition, renders it almost impossible to give fixed directions for navigating this river. It will, therefore, be necessary to employ a pilot, not for avoiding the dangers, but to prevent mistaking one channel for another. The lead should be kept going, and the main object is to avoid the great strength of the current.

Portions of the river that require great care in passing are: The channel leading from Pará south of Oncas island; the Goiabal pass; entrance to Breves pass; the west end of Aturia pass; the north bank between Prainha and mont Alégre; and Moreno rocks near the mouth of the rio Negro. With these exceptions, navigation is easy at all seasons.

Steamers leaving Pará at half ebb will carry the next flood above Breves, which is important, as the ebb runs very strong.

Tributaries of the Amazons.—The principal tributaries of the Amazons on the left bank are, the Branco, which unites the province of Pará with the Guianas; the Negro, which flows from Venezuela, and the Ica, from New Granada. The Morona, Pastaza, and Napo afford a communication between the northern parts of Peru and New Granada.

On the right bank are the Tocantins, the Xingu, and the Tapajos, in Brazilian territory, and the Madeira, in Brazilian and Bolivian territory; these four rivers have already been described. The Purus, Yurna, and Yavari, in Bolivian and Peruvian territory, and the Ucayali and Huallaga, in Peruvian territory.

Rio Negro.—This river enters the Marañon or Amazon proper in longitude 60° W., 855 miles from Pará. At the mouth of the Negro is situated the important town of Manaos, the capital of the province of Upper Amazon. It has 6,000 inhabitants, and is the terminus for the steamers trading from Pará. Although Pará is the great port through which the trade of the Amazon passes, Manaos has become the central point of operations. Thence to Santa Isabel, about 377 miles up the Negro, the navigation is easy for steamers of light draft, and it is only in the dry season that there are one or two passes where the river is not more than 3 feet deep. Above Santa Isabel, which formerly had communication by steamers, there are rapids, but they are not difficult or dangerous, and it is said a little engineering would render the river in that part also navigable for steamers of light draft. Large barges loaded with produce come down from San Carlos, in Venezuela, to Santa Isabel.

The United States is represented at Manaos by a consular agent.

Rio Branco.—At about 180 miles above the confluence of rio Negro with the Marañon the rio Branco flows into the former, and offers, it is said, during the greater part of the year, easy navigation for steamers of light draft for 200 miles, to the fort of St. Joaquim, not far from the frontier of British Guiana.

Rio Ica, or Putumayo, enters the Marañon in longitude 68° 20′ W. Very little is known of this river.

Rio Morona.—This river rises in the province of Ecuador, on the eastern slope of the main chain of the Andes, and flows into the Marañon in longitude 77° W. Only a slight examination of the Morona has yet been made, but the volume of water is great, and the slow current indicates a considerable depth and that the stream is navigable. The river flows through a very fertile region and gold washing exists on its banks. The town of Borja is near the mouth of the Morona.

Rio Pastaza, after a course from north to south, empties itself into the parent stream in latitude 5° 53′ S. and longitude 76° 20′ W. This river was explored in the middle of the last century by Señor Maldonado in a canoe, who made careful observations; but it has never been navigated by a steamer, so that no certain opinion can be formed as to its value as a means of communication, though its large volume and the level nature of the region it traverses in its lower course make it probable that it is a navigable stream.

Rio Napo rises in Ecuador, on the eastern slope of the volcano of Cotopaxi, and enters the Marañon in about longitude 72° 30′ W. The volume of the Napo is great, and the current so torpid that the waters appear almost stagnant. It traverses the renowned "land of cinnamon," first discovered by Gonzalo Pizarro and his lieutenant Orellan; and its banks, which abound in gold washings, are inhabited by well-disposed tribes. The Napo is said to possess an easy navigation by steam for 340 miles, as far as a place named Puerto de Napo, when Quito may be reached in six or seven days. At its junction with the Napo, the breadth of the Marañon is 1,800 yards, and its depth more than 100 fathoms.

Rio Purus, which is supposed to rise in about 12° S., flows nearly parallel to the Madeira, and empties into the Amazon in longitude 61° W.; this river forms a small part of the boundary between Bolivia and Peru. For a distance of 750 miles from its mouth the Purus has from 8 to 13 feet water, and for 430 miles more from 6 to 8 feet.

Rio Yavari, or Javari.—The mouth of this river is in latitude about 4° 40′ S., longitude about 70° 20′ W., 1,700 miles from the mouth of the Amazons and opposite the Brazilian station of Tabitinga, which is on the frontier between Brazil and Peru. At this part the Amazon is 1½ miles wide. The Yavari is a river of considerable volume: it probably takes its rise in the cerros de Canchaguayo, which are visible from the Ucayali river, a little to the south of the village of Sarayacu; it flows northeastward as far as latitude 5° 0′ S., longitude 71° 0′ W., where it receives a stream on its left bank called the Yavarisiñ, or Yavari-mirim; thence its course is nearly east and parallel to the Marañon. The Yavari also receives the rio Galvez on its left and the Paysandu on its right bank. Its course is tortuous, but it is navigable for steamers for a considerable distance; the region drained by it is fertile, being still covered with virgin forest.

Rio Ucayali.—This important river joins the Marañon on its right bank in longitude about 74° 0′ W., and as regards volume and length of course, it is a worthy rival of the parent stream. The two most important affluents of the Ucayali are the Pachitea and the Apurimac, or Tambo. The Pachitea is formed by the Pichis and Palcazu rivers, and at first flows in a tortuous course, but in a general northerly direction. At a short distance from its mouth it turns to the eastward, and finally flows into the Ucayali. The Pichis is believed to have its source in the Cordillera de la Sul and to be navigable for some distance.

The Palcazu rises in the cerros de la Sul, receives the rivers Pozuzu and Mayru, and eventually unites with the Pachitea. In 1866 the Palcazu was explored and ascended as far as the junction of the Mayru, which has been named Puerto Prado. It is near the city of Huanuco, and is the nearest point to Lima within the valley of the Amazon that has yet been reached by steamers. The Palcazu can certainly be navigated by steamers without risk during the rainy season, but in the dry season they are liable to get stranded. The Mayru is not navigable for steamers at any time.

The Apurimac, or Tambo, together with the Urubamba, joins the Ucayli. In December, 1870, when the Tambo was explored by Admiral Tucker, of the Peruvian navy, it was found to be very full with a current running out from 6½ to 8½ miles an hour. Its embouchure is 861 feet above the level of the sea, and the gradient of the stream was calculated as having a fall of 4 feet 5 inches in a mile. The Tambo, from its mouth to the falls of the Ene, offers no other obstruction to steam navigation than a strong current, which probably diminishes in the dry season. But at the falls the Tambo is impassable, even in a canoe.

It is not known whether there are any other obstacles above the falls, but it is believed that no impediments to navigation will be found, as there are no ranges of hills in the region through which the Tambo flows. At its mouth the country is flat. Ten miles higher up, a range of hills 150 feet high is met with, and the cliffs announce the proximity of rapids. The climate was found to be healthy and agreeable, the highest temperature being 86° and the mean 76°. It rained seventeen times in 35 days, and the prevailing winds were NE. from 10 a. m. to 4 p. m., and SW. during the night. In the early morning there were light mists, the air and water being of the same temperature.

Rio Urubamba.—This river has its source in the south of the department of Cuzco, in a small lake on the western side of the Cordillera of Vilcañota, and is 14,520 feet above the sea, according to Pentland. Thence the river flows in a SSE. and NNW. direction through the vale of Yucay, the favorite residence of the Incas, to the point where it bathes the ruins of Ollantay-tambo. Here it changes its course to north and enters the valley of Santa Anna, finally uniting with the Tambo.

As far as it is at present known the Urubamba is navigable for steamers as far as Maynique. Thence the navigation is difficult. The Urubamba has less volume than the Tambo. The region drained by the former, in its lower course, is fertile and clothed with virgin forest. It is inhabited by Indians, half civilized, but of docile and friendly dispositions, hard working, hospitable, and eager to trade.

Rio Huallaga rises in the silver-bearing mountains round cerro Pasco in about 10° S. and 76° W., and at first flows in a course from west to east, through the department of Huanuco. Near the village of

Muña it encounters the chain of the eastern Andes and is forced to take a sharp turn to the north, flowing between the central and eastern Cordilleras and emptying its waters into the Marañon in latitude about 5° S.

The Huallaga receives a multitude of small streams and torrents on either bank, but unfortunately this fine river is only navigable for steamers for a distance of about 70 miles from its mouth. The Pongo, or Salto de Aguirre is a rapid which is quite impassable for steamers, owing to the force of the current and the narrowness of the gorge through which it rushes. There are other rapids higher up the river which are difficult to pass even in canoes.

Navigation of the Upper Amazon.—Several companies, having in all about 32 steamers, varying in size from 20 to 600 tons, are established for the purpose of navigating the Amazon. The principal station is Pará; they perform two voyages a month, as far as Manaos, 855 miles from Pará, and two to Tabatinga, 1,700 miles distant from Pará. At Manaos cargo and passengers for places higher up are transhipped to smaller boats which go as far as Yurimaguas, in Peru.

A steamer also makes bimonthly voyages to Cametá. These vessels, with numerous small crafts and canoes that navigate the various rivers, may be considered the only means of communicating with the interior; for, although there are tracks leading into the forest from the different towns and villages, there is not a road properly so called in the provice.

The distances between the principal stations are nearly as follows:

	Miles.	
Pará to Breves	139	
Breves to Gurupá	107	
Gurupá to Prainha	122	
Prainha to Santarem	89	
Santarem to Obidos	66	
Obidos to Villa Bella	90	
Villa Bella to Serpa	135	
Serpa to Madeira River entrance	24	
Madeira river to Manaos	83	
Pará to Manaos		855
Manaos to Coary	252	
Coary to Teffe	118	
Teffe to Fonte Boa	148	
Fonte Boa to Tocantins	134	
Tocantins to Santo Paulo	94	
Santo Paulo to Tabatinga	107	
Manaos to Tabatinga		853
Tabatinga to Loreto	35	
Loreto to Pernate	78	
Pernate to Mancallacta	10	
Mancallacta to Pevas	35	
Pevas to Yquitos	90	

	Miles.	
Yquitos to Nauta	78	
Nauta to San Regis	35	
San Regis to Parmari	52	
Parmari to Urarinas	78	
Urarinas to La Laguna, on the Huallaga river	65	
La Laguna to Santa Cruz	35	
Santa Cruz to Yurimaguas	52	
Tabatinga to Yurimaguas		643
Pará to Yurimaguas, on the Huallaga		2,351

MADEIRA BRANCH.

	Miles.
Pará to Madeira River entrance	772
Madeira River entrance to Sapucaiaroca	134
Sapucaiaroca to Boa Esperanza	33
Boa Esperanza to Marmelos	101
Marmelos to San Roque mission	181
San Roque mission to Jamery river	49
Jamery river to San Antonio	49
Pará to San Antonio, Madeira river	1,319

Yquitos.—The town of Yquitos is about 3° 44′ S., and 73° 8′ W. between the Ytaya and Nanay rivers, is the largest and most important place in the Peruvian department of the Amazon, and the center of commerce. Here reside the commandant-general and other political and marine authorities; the population consisting of Peruvians and Amazonian Indians, with a few European engineers and artisans.

The region traversed by the Upper Marañon, from a point in about 5° 30′ S. and 78° 30′ W., is inhabited by warlike and hostile tribes of Indians known as Jibaros and Huambisas. The other villages on the banks of the Upper Amazon are situated near the stations where the vessels touch. They are small, and their inhabitants are Indians reclaimed from the savage state, who carry on a little trade with Yquitos, and supply the steamers with fuel.

CHAPTER IV.

COAST OF BRAZIL—FROM THE PARÁ RIVER TO CAPE CALCANHAR.

Remarks.—The north coast of Brazil is for the most part low, except in the vicinity of Ceara. It is from 100 to 300 feet high and is visible from 15 to 25 miles. There are no safe anchorages for vessels, and it is even difficult to find a landing for boats; this latter is only found at places where the reefs extend a few hundred yards out from shore, thus forming a shelter from the constant swell running from the eastward.

The entrances to the rivers are invariably open to the NE. and are obstructed by sandbars; these bars are becoming shoaler. The entrances all present a similar appearance. The western banks are covered with vegetation, chiefly mangrove bushes, and the eastern banks are composed of sand and are entirely barren. West of the Paranahiba river the coast is low and is remarkable for its complete barrenness. From Maranhão to Jericoacoara the coast is low and without prominent landmarks, followed to the eastward by the Cascarella and Azul mountains. These are from 10 to 15 miles inland. Between Jericoacoara and Mel points the lowland is varied by small hillocks and red cliffs.

From Mel point to mount Branco, vessels should not attempt to sight the land, on account of the numerous outlying detached reefs which are reached about the time the land is sighted.

Mount Branco is about 22 miles north of St. Roque and is visible 18 miles. A large part of the coast is imperfectly surveyed.

There is but one good harbor between Maranhão and St. Roque, and that is Tutoia bay. It is accessible at all times. During the winter months it is possible to communicate with any part of the coast (except between Corso and St. Roque) by anchoring within 2 or 3 miles of the beach near a point off which a reef extends, as it is found that a boat may land to the westward of these points without risk. The only places on the coast where provisions may be obtained are Maranhão and Ceara. But in cases of pressing necessity there are a few places, such as Amaracao and St. Roque, where beef and poultry may be bought, and sometimes sheep and goats. Vegetables and fruit are scarce, and even the banana is rarely seen.

Soundings.—A short distance off shore along the whole extent of this coast the depth of water is very great. In general it increases at the rate of 3 feet to the mile until 16 fathoms are reached; from 16 to 45 fathoms it increases very rapidly, and after 45 fathoms the depth becomes too great for ordinary means of sounding.

Tides.—All along this coast the tides are regular, increasing in strength in proportion to their distance from cape St. Roque.

The tidal current is rarely felt more than 10 miles from shore, except in the vicinity of Maranhão, where the tides are very strong, on account of the outlying shoals and formation of the coast. The strength of the tidal current varies with the locality, but it may be put down as not exceeding one mile an hour in the vicinity of cape St. Roque; whereas at Maranhão, when the tides are at their greatest strength, it frequently reaches 4 to 5 miles an hour, and its mean strength is from 2 to 3.

Coast.—Tijoca point is low and terminates in a flat, sandy beach; Curuça, the next point eastward, terminates abruptly and is a little higher than the land to the eastward.

These two points are separated by a deep inlet or river, named Curuça; it is of great importance not to mistake Curuça point for any of those near it.

Eastward of Curuça point is Cajetuba bay, of which Cajetuba islands form the eastern shore. Piracumbana bay, with the island of same name at its head, is formed between Cajetuba islands and Marapani point, the north extreme of Maranduba island. This point is distinguished by a small hummock and by its sandy shore and downs, which, though not very high, are easily recognized, being the only point of the coast with that aspect between Pará river and Atalaia point. Its recognition is important, because on its meridian is the most northern part of the great bank which borders the coast. The bank trends west-northwestward from the meridian of Praia Grande island, passing nearly 4 miles north of Marapani point, whence it trends west for 10 miles, and then turns WSW. for Curuça point.

Atalaia point is 15 miles east of Marapani, with Maracuno and Salinas bays in between. These bays are separated by Praia Grande island.

Banks.—Between Curuça and Cajetuba points, and from 4 to 5 miles distant from them, are isolated banks, extending over a distance of about 6 miles, east and west, with depths of 2½ to 5 fathoms; and from 5½ to 7 fathoms between them and the shore bank, which is distant about 1½ miles.

One of these, a patch of 2½ fathoms, lies N. 22° W. (N. 17° W. mag.) of Cajetuba point, and foul ground is reported to extend frow 3 to 4 miles ENE. from it.

A bank reported to lie about 13 miles northward of Cajetuba point is stated to be 2½ miles in length, east and west, by 1½ miles in breadth, with a depth of 2¾ fathoms. Also about 5 miles to the westward, in latitude about 0° 18′ 50′ S., longitude 47° 48′ W., the telegraph steamship *Norseman* is reported to have struck on a shoal of 17 feet or less. This shoal is considered to be identical with it.

Salinas bay lies close to the westward of Atalaia point, from which the coast takes a SW. direction to Salinas village, situated on a wooded plain. The head of the bay presents a long sandy beach and some low sand hills. From a distance the white church of the town, about 60 feet above the sea, only is seen, but when within 6 miles the red roofing of the houses can be distinguished.

The level lands on which Salinas stands gradually decreases in height to the west, and terminates with a clump of high trees, by which it will be known.

Salinas bay is bounded on the west by the island of Praia Grande; this island is remarkable for having on it a very high tree, and also for a sandy beach on its NE. point.

Laplace shoal, having a depth of 18 feet, hard sand, lies off Atalaia point; there are depths of from 5 to 8 fathoms at 200 yards northeastward of the spot. From the shoal heads Atalaia point bears S. 50° E. (S. 44° E. mag.), distant 3½ and 4¼ miles, and from the northwestern or farthest head the west point of Praia Grande bears S. 62° W. (S. 68° W. mag.). A shoal of 5 fathoms lies about 2 miles N. 64° W. (N. 58° W. mag.) of Laplace shoal.

Atalaia point separates Salinas bay from False Salinas. From the eastward it appears like a small round island, but it is soon seen to be connected with the mainland by small hummocks. A lighthouse stands on the point and appears to be a good day mark from certain directions.

Light.—On Atalaia point is a lighthouse, which exhibits, at an elevation of 101 feet, a fixed and flashing white light every two minutes and should be seen in clear weather from a distance of 17 miles Reported visible only 12 miles.

Shoals.—From Atalaia point shallow water of 2 fathoms or less extends in a N. 67° W. (N. 61° W. mag.) direction for nearly 5 miles, its northern point being 2½ miles N. 29° E. (N. 35° E. mag.) from Praia Grande island. Between the distance of one and 2 miles westward from Atalaia point the bank curves toward the shore, and passing close to that point affords deeper water closer in. Eastward of Atalaia point the bank takes an ENE. direction for 2½ miles, and thence trends eastward parallel to the shore at about that distance.

At 3 miles N. 29° E. (N. 35° E. mag.) of Atalaia point is a shoal of 4¼ fathoms, with from 5 to 6 fathoms between it and the shore bank, and 9 fathoms outside.

Anchorage.—Vessels may anchor in Salinas bay in about 7 fathoms, with the lighthouse bearing S. 28° E. (S. 22° E. mag.) and distant from 2 to 2½ miles.

From the uncertainty which exists regarding the shoals vessels are recommended to approach Salinas bay with great caution.

Pilots.—There is a pilot station on Atalaia point, and vessels bound for Pará and wanting a pilot will meet one of the schooners of the

Pará pilot service off Salinas. This schooner in the daytime carries a white and red quartered flag and at night a white light at the mainmast. It is doubtful whether pilots may now be obtained, as heretofore, by sending on shore to Salinas village; if a boat is sent she must be in time to cross the bar of the little river west of the village at near high water, and to leave before one-third ebb, as the sea breaks heavily at other times. At night vessels requiring a pilot should burn a blue light.

Tides.—It is high water, full and change, at Salinas at 7h. 15m., and at the anchorage about 8h. 15m.

Dangers.—Between the meridians of Atalaia point and the San João islands there exist several outlying dangers, some of which are known and others doubtful.

It is generally understood that the extensive bank fronting the coast between Pará and Maranhão has increased to the northward in detached patches, few of which are known. Vessels navigating in this vicinity should keep the leadsmen at work and be ever on the alert to avoid disaster.

False Salinas bay is remarkable from the white sand downs at its its eastern point. Seen at a distance they look like breakers or vessels' sails; one of them in particular, separated from the three principal, appears like a boat's sail with the sun shining on it. A small hillock of white sand, about 2 miles eastward of Atalaia point, is remarkable.

Mount Piraussu.—At the distance of nearly 8 miles, S. 6° W. (S. 12° W. mag.) of Salinas village is mount Piraussu, rising above the land near it, and seen in clear weather when coming from the eastward.

Carro point, the west point of Miriquiqui bay, is marked by a clump of trees, which are higher than those on the neighboring coast; when seen at some distance from the NE. it has the appearance of a fortification, and is known among the pilots by the name of Caro di Mato.

Maniji island is low and woody, and forms the western shore of Caïté bay, which it separates from Coati Paru and Miriquiqui to the westward; these bays have for their common boundary a slightly projecting point named Japirica, or False Carro di Mato, which is distinguished from the land near it by its being rather higher and by the reddish color of its extremity. Also it is remarkable for appearing, particularly from the ENE., as an island, round at the top, and well separated from the mainland.

Buckle bank.—At about 28 miles northward of Maniji point is a bank on which was found only 26 feet of water. Its position is marked doubtful, and named Buckle bank, after the commander of that vessel.

Caïté bay.—This bay, the largest on this portion of the coast, is remarkable for three islands which divide it into nearly two equal parts, the northernmost being nearly 4 miles from the head of the bay. This latter island has on its northern side a sandy beach, terminated on the west by a small cliff, by which it is easily recognized. It is impossible to mistake them for the Punga islets, which always appear well separated, whilst the Caïté islets are blended together, and make almost as one island.

Caïté bay is bordered by the great bank which borders this coast. A break in this bank leads to an anchorage westward of the islands, but the channel is difficult to navigate, and only practicable for small craft. The river of the same name discharges itself into the southern part of the bay.

Japarigues islets.—Punga bay, between Anajaer point and Carauassu, 10 miles beyond, is distinguished from that of Priatinga by the two small Punga or Japarigues islets, which lie in the center of it. Separated from each other by a small channel of about one mile in breadth, and lying in a line parallel to the track in running along the coast, the Japarigues islets never appear in line from a vessel off the coast, but are separated and distinct; this is important, as it prevents their being mistaken for the islands in Caïté bay to the westward.

Priatinga bay is between Carauassu island and Manejetuba island, about 12 miles to the eastward.

Resolution shoal.—In June, 1872, the steamer *Lisbonense* touched on a bank said to be in latitude 0° 44′ S., longitude 46° 25′ W., about 8 miles northward of the nearest part of Manejetuba island. This shoal was searched for in vain by H. M. S. *Dart* in September following.

In October, 1893, the brigantine *Mercur*, drawing about 12 feet of water, struck and was lost on a rock over which the sea was breaking heavily, situated with cape Gurupi bearing about S. 33° E. (S. 27° E. mag.) distant 15 miles. Approximate position as given, latitude 0° 42′ S., longitude 46° 22′ W., but it appears probable that she was nearer the coast. This position is about 4 miles westward and southward of the Lisbonense Shoal.

The British brig *Resolution*, drawing 15 feet, was wrecked on a shoal reported to lie with Carauassu island bearing about S. 23° W. (S. 29° W. mag.) distant 10 miles, or in (approximately) latitude 0° 38′ S., longitude 46° 36′ W. This position is about 12 miles northwestward of that given for the shoals on which the *Lisbonense* touched.

Caution.—The bank bordering the coast extends off to a distance of 4 miles from Manejetuba and approaches to within one mile at cape Gurupi. Between Caïté islands and cape Gurupi, within a distance of 20 miles from the coast, the greatest caution should be used on account of the various reports of shoals in this locality and the evidences that some do exist.

Priaunga bay.—Eastward of Manejetuba island is Priaunga bay, the eastern side of which is bounded by cape Gurupi. At the head of the bay are three islands, by which it may be known.

Cape Gurupi.—This cape is remarkable for its apparent distance from the adjoining land, and by the sands at its foot which accumulate in some places into heaps or steep banks.

Also southward of the cape are three hills or mounds, rising from the shore at the head of Gurupi bay to a distance of 25 miles in the interior. Although only of moderate height, they are remarkable because the land eastward and westward is low.

Pria bay.—From cape Gurupi to Pria islands the land recedes and forms a large bay. The islands of Sumacas, Redonda, Gurupi, and Rasa lie in front of this bay. The Gurupi river flows into its eastern part.

East of this bay lie Pria island and the Dos Irmoens.

The space between them is known as Trumahi bay.

Mount Pirucaua is the only remarkable point of this coast, and is an isolated hill situated some distance from the sea and readily distinguished from the offing.

Thence eastward come the islands of Joãosinho, Pirucaua, Maracasumé, each of which gives its name to a bay to the westward of it. The land generally slopes away to an end at each island, scarcely any ending with a bluff. Pirucaua bay has an anchorage difficult of access through the banks which extend off to the northward and eastward of the island of the same name.

Tamandua point projects about 7 miles to the NE., and off it at the distance of about 8 miles is the northern extremity of a line of breakers which continues along the coast at a distance of from 5 to 7½ miles, as far as cape Gurupi which it approaches to about 1½ miles. This bank, broken in several places, forming entrances to the small bays, surrounds also the numerous islands which border the coast. Near Tamandua point is the small island of Motuoca, between which and Acara island is Motuoca bay.

Caution.—Banks.—This part of the coast is imperfectly surveyed, and should be approached with great caution and generally not nearer than 10 miles. The deposits from the Amazon are said to form banks which in their turn are washed away again; some of these banks are said to be found at a distance of 10 or more miles from the land. The lead, therefore, should be constantly used.

San João islands.—These islands are low and lie 20 miles eastward of Tamandua point. They are separated from each other by narrow channels, and on the NE. part there are sandy downs and a lighthouse, by which they can not fail to be recognized. The most eastern of the group is 70 feet about the sea, entirely without vegetation and remarkable. It is composed exclusively of white sand, which has procured for it the name of Little Lençoes. From the east end of the group a bank of sand extends to the eastward, nearly 8½ miles, on which the sea breaks; on the north side is a flat of yellow sand, rather steep on the NW., but sloping gradually to the NE.

Light.—From a lighthouse erected near the NE. extremity of San João islands, is exhibited, at an elevation of 85 feet above high water, a fixed white light, visible in clear weather from a distance of 14 miles.

The lighthouse, constructed of iron, is hexagonal in shape, and painted red; the keeper's dwelling is white.

Tides.—Is high water, full and change, at San João islands, at 6h. 24m.; springs rise 14 feet, neaps 10½ feet.

Anchorages.—There is anchorage on the western side of San João group to the NE. of Muricipuč bank, which is seen by the breakers. It is more sheltered as a vessel proceeds to the south or nearer the land. It is, however, prudent not to bring the mouth of the most northern channel on the west side of the group to bear eastward of S. 50° E., (S. 44° E. mag.), and not to go into less than 6½ fathoms water. This channel between Tocausa and Maranduba islands, which has about 7 feet in the entrance at low water, affords anchorage in from 3 to 4 fathoms, about 2 miles within the entrance points. A vessel of light draft requiring repairs and consequently having to stay a long time at these islands, could, by passing through the narrow channel which runs along the west side of the principal group, anchor between them and Jabaroca island where she would be more sheltered than outside.

Turyassu bay is bounded on the east by the San João islands, and on the west by Tamandua point. The bay has an opening of about 20 miles in breadth, almost entirely occupied by sandbanks.

Manoel Luiz reef is a dangerous group of rocks some of which are nearly awash at low water. It is situated N. 59° E. (N. 65° E. mag.) distant about 48 miles from San João lighthouse, and N. 9° E. (N. 15° E. mag.) 77 miles from Itacolomi lighthouse. The reef is about 3 miles in extent in a WNW. and ESE. direction, and more than ½ mile in breadth. On several of the sunken rocks there are from 5 to 15 feet water, with 8, 10, and 12 fathoms close-to, and about 22 fathoms, sand and broken coral, just beyond. The sea breaks on them only at short intervals during low water; it is therefore almost impossible to see them unless passing very near.

The breakers, which rise suddenly, have the appearance of the spouting of a whale, while the sea is smooth about them; and when they cease they leave masses of white foam which continue for some time. The west end of the reef is in latitude 0° 51′ S., longitude 44° 17′ W.

No reliable indication of a vessel's distance from the Manoel Luiz reef can be gathered from the soundings; the depth and nature of the bottom near it is so variable that no correct data can be deduced. The white sandy bottom with black and red specks comprised between the meridian of Coroa reefs and the coast of the mainland to the westward, extends from 30 to 45 miles northward of the entrance of San Marcos bay; but occasional soundings are found of a different nature. Beyond this limit, and also on the bank eastward of the meridian of Coroa reefs, the bottom is sand and broken coral.

Tides.—It is high water, full and change, at Manoel Luiz reef at 5h.; and the rise is 12 feet. The tide runs regularly six hours each way, the flood to the SW., and the ebb to the NE., one mile an hour.

Da Silva reef.—This shoal is said to have been discovered by M. Da Silva, an officer in the Brazilian navy; but, if in existence, its exact position has not yet been verified. The place assigned it is about 21 miles northward of Manoel Luiz reef, in latitude 0° 32′ S., longitude 44° 19′ W., and it is questioned if this latter shoal, before its position was verified by Baron Roussin, has not been taken for it.

Shoals.—In October, 1872, a shoal was reported in the middle of the passage between San João islands and Manoel Luiz reef, in latitude 1° 4′ S., longitude 44° 32′ W., 19 miles S. 56° W. (S. 62° W. mag.) of the center of Manoel Luiz. A depth of 5 fathoms was reported on the shoal, with 22 fathoms close to its NW. side.

The bark *Winifred*, in 1879, is reported to have struck on a shoal of about 9 feet, in latitude 1° 10′ S., longitude 44° 34′ W., or about 5 miles S. 20° W (S. 26° W. mag.) of the 5-fathom shoal just described. They are probably one and the same shoal, but great caution must be exercised when navigating in this locality.

With these exceptions, the channel which separates San João islands and Manoel Luiz reefs is stated to be clear. Commander H. V. Haggard, in H. M. S. *Virago*, 1856, says, "the nature of the bottom changing from fine white sand with black specks, to coarse brown sand with stones and broken shell, denotes that a vessel is north of San João."

Ambrose shoal, on which the steamer of the same name struck in 1870, is situated in latitude 1° 33′ S., longitude 44° 37′ W., about 5 miles NE. of Mangas isle at the entrance of Cabello da Velha bay. It is reported to extend 2 or 3 miles in an ENE. and WSW. direction, with depths of 4 to 6 fathoms on it.

Coast.—The coast from San João islands trends about SW. to Cuma bay and is intersected by bays, streams, and a chain of islands. The approaches to them are encumbered by sandbanks separated by narrow channels, practicable only for small vessels. The San João islands separate Turyassu and Turyrana bays. Turyrana bay is encumbered with shoals and is considered closed to navigation. Mangas isle is about 14 miles SW. of Tury point; between are the small islands of Carapatitiva and Gajirutiva. South of Mangas isle is Cabello da Velha bay, which is deep and receives several streams; it affords anchorage for small vessels, reached by a channel on the north shore, but, like all those on the mainland, its navigation is difficult. Canoca point is the southern point of this bay. Beyond it to the SW. is Tree island forming with Tucunanduba island, which immediately follows it, Tucunanduba bay. About 10 miles southward of this latter island is the entrance to Cuma bay.

Cuma bay forms a deep indentation which is about 25 miles in length by about 5 miles in breadth; it is encumbered with shoals. In the middle of the entrance is a small island named Ovos, near which there is said to be anchorage; but the channel leading to it has not been surveyed. Several rivers, of which the principal is the Guimarens, empty themselves into the bay.

San Marcos bay.—Its entrance lies about SW. and NE.; its least breadth is about 7 miles, and from the parallel of morro Itacolomi it extends southward for about 22 miles to the harbor and town of Maranhão. The bay is bounded on either side and encumbered with dangerous shoals, which require caution in approaching. It is, however, navigable for vessels of the largest draft. A vessel having made the land, with not sufficient daylight for entering the bay, should stand off for the night, keeping on the meridian of Santa Anna lighthouse, and at such a distance as to insure being in the fairway in the morning.

Morro Itacolomi, 269 feet high, and covered with trees, is situated at the west point of the entrance to Maranhão bay. When first seen, it appears like a small round islet, and in clear weather may be visible from 15 to 20 miles. By this isolated mount and the lighthouse near it, the coast may be readily known; the land to the northward forms a deep bay, and to the southward it is composed of low red cliffs, trending about SSE. There is no similar mark in the vicinity, and it is therefore a good landmark and point of departure.

At the distance of 5½ miles southeastward of the morro, is Pirajuba, a cliffy point, and nearly 4 miles further on is morro Alegre, 187 feet high, with some red cliffs just to the northward. At about ½ mile southward of morro Alegre is a yellow spot in the land, which is remarkable, and beyond it, at a distance of 2½ miles, is Raymondo point marked by red cliffs.

Nearly a mile to the southward of Raymondo point there is a remarkable sandhill. Westward of Tatinga point, which is in the form of a small hill, the land trends westward, and at the distance of 1½ miles is the town of Alcantara, with the island of Livramento in front of it.

Alcantara.—The town of Alcantara stands on a hill; the houses are built of stone, many of them two stories in height, but the greater part have a ground floor only. It has a town hall and several churches. A vessel may anchor 1½ miles SE. of the town in 9 or 10 fathoms, sand, with Tatinga point bearing about N. 17° E. (N. 24° E. mag.); coasters anchor about a mile distant in about 3 fathoms. There is a light at the port.

Itacolomi bank.—Itacolomi bank extends 8 miles ENE. from the lighthouse of that name, and in the depth of 4 fathoms, near its outer end, is about 3 miles wide. At 5 miles N. 69° E. (N. 76° E. mag.) of the lighthouse the depths are from 2 to 2½ fathoms, with a patch of 2½ fathoms, distance 6½ miles in the same direction, outside of which the water deepens. Within a distance of 5 miles of Itacolomi point the soundings on the bank vary from one to 2 fathoms. There is a cluster of rocks, some of which are above water, lying 1½ miles N. 58° E. (N. 65° E. mag.) from the lighthouse. From the parallel of the lighthouse, distant about 5 miles, the edge of the bank is continued almost in a direct line towards Piraroma point, but stretching seaward 1½ miles abreast morro Alegre. Vessels should not anchor on this bank, as the anchor sinks deeply and is often lost.

Ovos banks extend about 5 miles off the shore, northward of morro Itacolomi. They usually break, but as the soundings, in approaching them, are irregular and the tides strong, it is advisable to give them a wide berth at all times.

Almas bank, which is connected with the Peixada, is a shoal about 2½ miles long, in a north and south direction; the shoal parts are rocky, the others of sand and shell. From the depth of 3 feet Itacolomi point lighthouse bears N. 59° W. (N. 52° W. mag.), distant 10 miles. Two miles to the westward of the center of Almas bank there are several patches of from 3¾ to 4¾ fathoms. Piranema point, in line with Raymondo point, leads to the westward of Almas and Peixada banks, in about 10 fathoms.

Peixada bank (Fishing bank) has depths of from 2¼ to 4¾ fathoms, sand and shell. It is steep-to on its east and west sides. From its shoalest part, which is near the southern end of the bank, Itacolomi lighthouse bears N. 69° W. (N. 62° W. mag.) 8¼ miles.

Meio bank.—In the middle of the bay, about 8 miles S. 80° W. (S. 87° W. mag.) of Grande Coroa bank, is a quicksand, named Meio, or Middle bank, composed chiefly of fine gray sand, with black specks. It is 8 miles in length, in a NE. and SW. direction, with a mean breadth of ½ mile. The depth of water over it varies from 2 to 5 fathoms, the shoalest part being 1¾ miles from the SW. end.

Between the NE. end of Meio bank and Grande Coroa is a bank with 2¾ fathoms, and another with depths of less than 6 feet, and between Meio bank and Maranhão island is Coral bank and several others. The western edge of Meio bank is steep-to, and its distance from the land renders the approach to it uncertain by the lead, but the discolored water usually indicates its position, even on a dull day. It is unsafe to anchor on this bank, as anchors sink irrecoverably into the sand.

Grande Coroa stretch for the distance of 18 miles in a northeasterly direction, and about 10 miles in a northerly direction from Maranhão island, with a breadth of about 15 miles, east and west. These reefs are divided into several ridges, on the three principal of which the sea generally breaks. It has been observed that the sea always breaks during the ebb tide, but that the reefs do not show during the last half of the flood.

They are, however, generally well defined, steep-to, and at a distance of a mile on the north and west sides there are depths of from 7 to 20 fathoms; but they should not be approached nearer than 2 or 3 miles. The prevailing winds being from the eastward, enable vessels bound to Maranhão to pass these dangers at a prudent distance, and reach that anchorage without tacking. From the northern edge of the reefs, morro Aracaji, on Maranhão island, will be seen in clear weather, distant about 19 miles.

Three Brothers.—The experience of masters of vessels trading for many years to Maranhão, points to the non existence of the Three Brothers shoal. It is said to lie about 22 miles N. 40° E. (N. 47° E. mag.) of the NE. point of Maranhão island, and 13 miles N. 52° W. (N. 45° W. mag.) of the north point of Santa Anna island. The shoal was reported in 1808 by a ship of the same name, and was unsuccessfully searched for by M. Mouchez. As it is near the position of a shoal formerly marked on the charts, great care is necessary when navigating this locality.

Cerca bank lies off the town of Maranhão, at the NW. limit of the anchorage. It extends 2¾ miles in a NE. and SW. direction, and is about 800 yards in breadth, with 4 feet on its shoalest parts, and on which the sea breaks. The center of the bank, principally rock, lies about 2¼ miles N. 71° W. (N. 64° W. mag.) of San Marcos lighthouse. The church of Nossa Senhora dos Remedios, in the NE. part of San Luiz, in line with San Francisco point, leads south of the bank. The NE. end of this bank is marked by a buoy, painted black, white, and red in horizontal stripes.

San Marcos bank, situated one mile northeastward of San Marcos lighthouse, is composed of sand and coral, with patches of less than 6 feet. It extends about 2½ miles in an E. by N. and W. by S. direction, with a breadth of about 1,400 yards. It nearly always breaks at low water. Between the bank and the shore is a channel with depths of 2 to 2¾ fathoms. A detached patch of 2 fathoms lies nearly one mile NE. of the bank.

Medo island.—Boqueirão channel.—At nearly 3 miles S. 68° W. (S. 75° W. mag.) of Areia point, entrance to San Luiz, is Medo island, about ½ mile in extent; and about ½ mile NE. of it are some rocks which uncover at low water. The island and rocks are surrounded by a bank, between which and the flats extending from the shore is a channel named Boqueirão. It is about 400 yards in breadth, with depths of 5½ to 13 fathoms water. It should not be attempted without a pilot.

Maranhão island, separated by a narrow channel from the main land southward of it, is about 25 miles in length, in a NE. and SW. direction, and 15 miles in breadth. It is fertile and well wooded, and intersected by white cliffs on its northern side.

Maranhão harbor.—From San Marcos lighthouse the coast becomes low and trends southwestward to Areia point, which is low and sandy, and has a small fort named San Antonio on it. It is fronted by a sand bank. From Areia point the coast trends southeastward, forming a deep inlet about one mile in breadth, in which is San Luiz harbor. The town of San Luiz is situated 1½ miles within Areia point, and nearly opposite Bomfim, the south point of entrance. It stands on the promontory which divides the small rivers Anil and San Francisco.

Buoyage.—The term starboard denotes that side which is on the right hand of the mariner entering from seaward; the term port that on the left hand under the same circumstances.

Conical buoys, painted red, with even consecutive numbers, mark the starboard side of the channel.

Can buoys, painted black or black and white, with odd consecutive numbers, mark the port side of the channel.

Buoys or other marks, in mid-channel, are painted in horizontal stripes of any two colors.

Buoys marking rocks in the channel, with a passage on either side, are painted in black, red, and white horizontal stripes.

Wreck-marking buoys are painted green, with the letters C. S. on them.

San Luiz, or Maranhão, is about one mile in length and ½ mile in breadth, and contains a cathedral, many churches, three monasteries, and 6 hospitals, of which the Misericordia is the principal. It has numerous schools, and a good hospital for merchant seamen, which is kept up by certain charges on all vessels arriving.

Maranhão is said to be better built than any other town in Brazil, and ranks as the fourth in the Empire. It is tolerably healthy, and no serious endemic sickness is known. In the time of the rains there are some few cases of fever, which generally yield with proper treatment. The population of the province of Maranhão is 488,000; that of the town, 35,000.

The United States is represented by a consular agent.

Supplies.—Vessels will find all necessary supplies at Maranhão. The water for shipping is good, but not very abundant; cattle may be procured with facility, and particularly on the mainland. Vessels can repair, beach, and, if necessary, heave down. Repairs to engines are undertaken by the factory.

Coal.—About 1,500 tons of coal are usually kept in stock. Vessels of 18 to 20 feet draft can coal in the harbor, where it is put on board at the rate of about 150 tons per day. Outside, in the anchorage, coaling is slow, and is put on board by lighters at about 60 tons per day. The increased expense and risk outside is considerable, particularly in the dry season—June to November—when the strong tides and winds interfere much with coaling.

Gridiron.—A gridiron in the Anil river will take vessels of 15 feet draft at high water spring tides. In the channel leading to it there is a depth of 24 or 25 feet at the same time.

Port charges.—Customhouse fixed, 25,000 reis; customhouse, municipality, tonnage, and hospital depend on numbers of tons as well as of crew. It varies from 175,000 to 215,000 reis. Lighthouse dues depend on tonnage—from 40,000 to 100,000 reis and 10 per cent; lighthouse certificate, 1,200 reis; maritime dispatch stamp, up to 500,000 reis of cargo, 2,000 reis, and for each 1,000,000 reis or fraction thereof, 4,000 reis and 10 per cent; Brazilian bill of health, 2,200 reis.

Pilots may be obtained by making the usual signals. Vessels requiring them should heave to about 2 miles northward of fort San

Marcos. They generally board the vessels inside Meio bank. Pilotage is compulsory.

Pilotage and mooring.—Vessels drawing 10 feet, 60 milreis; 11 to 15 feet, 80 milreis; 16 to 20 feet, 100 milreis ; exceeding 20 feet, 120 milreis. Change of mooring, 20 milreis.

The bottoms of iron vessels foul rapidly. Ordinary repairs for machinery can be made.

Communication.—There is cable communication with coastwise ports.

Lights.—Near the shore in the vicinity of morro Itacolomi, on the western side of San Marcos bay, stands a large two storied white house surmounted by a square tower, which exhibits, at an elevation of 157 feet above the sea, a *fixed* and flashing white light every two minutes, and should be visible in clear weather from a distance of 18 miles.

At Alcantara, from a lighthouse on the point southeastward of the town, is exhibited at an elevation of 72 feet above high water a *fixed* white light, visible in clear weather from a distance of 9 miles. It is probably not seen from seaward until open of Tatinga point.

On point and fort San Marcos, at 1½ miles NE. of the entrance to San Luiz harbor, is a lighthouse which exhibits at an elevation of 119 feet a *fixed* white light, visible 15 miles.

At Areia point, from a light house on fort St. Antonio, north side of entrance to the harbor, at an elevation of 30 feet above high water, is exhibited a *fixed* light, showing white between the bearings of S. 50° E. (S. 43° E. mag.) and S. 17° W. (S. 24° W. mag.); and *red* between the bearings of S. 50° E. (S. 43° E. mag.) and N. 73° W. (N. 66° W. mag.), visible in clear weather from the distance of 9 and 4 miles, respectively.

Seasons.—The year at Maranhão may be divided into two seasons. The winter commences in December and ends in May, and the summer follows and continues during the other months of the year. The first of these seasons is that of the rains, which fall abundantly; the winds then are generally from east to north, weak and variable, with heavy squalls from NW. and SW. in February, March, and April. The thunder and lightning are then almost constant. Hurricanes are not experienced at Maranhão, and in the worst part of the year there are long intervals of tolerably fine weather.

Rain falls sometimes during summer, and in this season the winds blow mostly from SE. to east with a force of 7 to 8 during the day, but much lighter at night, these being the general winds. At the change of season, from dry to rain, the winds are variable and incline to the westward. The temperature of the air is high in the town, more especially from the month of December to that of June. Maranhão, standing on the west side of the island, does not experience the full force of the winds from the eastward, those which reach it being weak.

Tides and tidal currents.—It is high water, full and change, at the customhouse quay, at 7h. 0m.; springs rise 16½ feet, and neaps 10¾ feet. At the anchorage outside the harbor the flood sets SSW. and the ebb NNE. South of Meio bank the tides set SW. and NE. Between Alcantara and San Marcos points the tides run from 3 to 5 miles an hour; between Peixada and Meio banks, from 2 to 4 mile. In the broad channels the strength is from 2 to 3 miles an hour; in the offing from 1½ to 2 miles in the same direction, namely, NE. and SW. During the strength of the tide there are heavy overfalls in all the channels, at which period it is unsafe for ships' boats.

Entrance channel.—An extensive mud bank, partly dry at half-tide, extends across from the west side of the harbor, and to the northward and westward of Bomfim point to about 300 yards of Areia point, which contracts the navigable part of the channel to San Luiz, to a breadth of from 300 to 500 yards. The bar, with 15 feet at low water, lies nearly ½ mile northwestward of Areia point; from thence, the channel passes rather more than 200 yards south of the point; inside the depths are from 16 to 24 feet.

A red buoy marking the telegraph cable lies S. 78° W. (S. 85° W. mag.), distant 1½ miles from Areia point.

Anchorages—There is a depth of 18 feet off the customhouse, but as the channel is narrow, caution must be used when taking up a berth. It is necessary to moor. There is good anchorage for a long vessel half way between the fort and San Francisco point, with the latter bearing S. 43° E. (S. 36° E. mag.), in not less than 3½ fathoms; this position is nearly always clear, as merchant vessels go higher up.

A vessel which has but a short time to stay in San Marcos bay will find a berth in 10 or 11 fathoms, sand and mud, with smooth water, in Algoas road, about a mile northward of San Marcos bank. Vessels frequently lose their anchors here.

There is a good anchorage in the road outside the harbor, between Cerca bank and fort San Antonio, with the latter bearing S. 61° E. (S. 54° E. mag.), distant from ¾ to one mile, in from 7 to 9 fathoms, over sand, gravel, and shell. Small vessels anchor nearer Medo island. This anchorage is convenient on account of its proximity to the port; but during strong winds the sea is frequently heavy, which sometimes occasions the loss of anchors. Vessels should not anchor too near the bar, as the bottom here is of quicksand, into which the anchors sink deeply, with occasional patches of rocks.

There is anchorage, always sheltered from the sea and which is best adapted for vessels of large draft, southward of Medo isle, in 11 fathoms, sand and mud. It is still better southward of Itaqui point, in from 15 to 16 fathoms, mud. The tide here is much less rapid and the sea smooth, but that south of Medo has every security and the advantage of being nearer the town.

Directions.—As the prevailing winds are those from the eastward, it will be prudent for a vessel bound to Maranhão, from whatever quarter, to make the land to the eastward, about the Lençoes Grandes, and then steer to the northwestward along the coast, which should not be approached nearer than 10 or 12 miles in from 10 to 15 fathoms water. As the flood tide runs rapidly to the SW., towards San José bay, it is necessary that a vessel in passing it should steer well to the northward, to clear Santa Anna reefs, which are steep-to; and when seen Santa Anna light can be passed at a prudent distance, taking care to allow for the flood tide. Bearings of Santa Anna light in clear weather will assist in ascertaining the position.

Having passed 3 miles northward of Santa Anna reefs, and being on the meridian of the lighthouse, steer S. 87° W. (N. 86° W. mag.), about 30 miles, when morro Itacolomi, which is visible from 15 to 20 miles in clear weather, should be seen like a small islet in the horizon ahead, having made due allowance for the tide, the rate of which may be taken as 2 to 3 miles an hour near the banks and 1½ to 2 miles in the offing, the flood running about SW. and the ebb NE. The above course, checked by bearings of Santa Anna light, will carry a vessel southward of the supposed position of the Three Brothers, the existence of which is doubtful, and about 2½ miles northward of Grand Coroa, the breakers on which, if there be any sea, will probably have been seen.

If the weather be clear, morro Aracaji, on the north part of Maranhão, which is visible 19 miles, will be seen at the same time as the breakers of Coroa bank, and soon after losing sight of Santa Anna light. The island is higher than that of Santa Anna and will also be known by its white cliffs. In proceeding to the southward, morro Alto, a nipple hill, 184 feet high, whose sides are wooded and marked in vertical white stripes, will be seen; also San Marcos point with its lighthouse, about one mile to the westward of morro Alto, terminating in an abrupt point.

The best and most frequented route to San Luiz is that westward of Meio bank, between it and Almas bank. With morro Itacolomi or the lighthouse bearing about west, and distant 15 miles, morro Alegre (which is the highest point of the coast southward of Itacolomi, and which has some red cliffs to the northward of it), will bear S. 51° W. (S. 58° W. mag.), and morro Aracaji, S. 7° E. (south mag.). From this position steer S. 29° W. (S. 36° W. mag.), between Meio and Almas banks, in from 17 to 20 fathoms water, observing that Tatinga point open of Raymondo point red cliffs leads southwestward of Almas bank. In hazy weather the discolored water on the Meio bank will assist in checking the vessel's position, but the morro should be sighted before attempting the channel. When San Marcos lighthouse, or fort, which is seen like a small islet in the horizon, bears S. 6° W. (S. 13° W. mag.), steer for it until Medo island bears S. 45° W. (S. 52° W. mag.), when steer for that island, which will lead midway between Cerca bank and that bordering the shore to the anchorage off the town.

A vessel may also pass to the westward of Peixada and Almas banks by keeping Pirarema point in the line with Raymondo point, bearing

S. 18° W. (S. 25° W. mag.). When within 3 miles of the red cliffs of morro Alegre she will be abreast the breakers on Almas bank and should steer for San Marcos light, about S. 7° E. (south mag.).

There is a channel eastward of Meio bank, but although the shoal parts on that bank can be seen, it is inadvisable to attempt it without local knowledge, as there are shallow patches about 2 miles to the eastward of that bank. This channel is often taken by pilots in vessels leaving late in the day, as there is convenient water for anchoring.

As the tides are strong and the outer edges of the banks are steep-to they must be approached with caution. The soundings, being irregular in their vicinity, are not a sufficient guide for clearing them at night.

If the night be far advanced or the weather thick the seaman will do well to stand off and on and not to anchor on the Meio or Itacolomi banks, as vessels doing so generally lose their anchors.

Entering Maranhão harbor.—At low water the banks are sufficiently uncovered to show the channel. From the anchorage off the entrance Areia point may be steered for, bearing S. 67° E. (S. 60° E. mag.) until within ½ mile of it, when course must be altered to pass about 200 yards south of fort San Antonio, on Areia point; thence keep between the buoys marking the harbor. Unless it is exactly high water the set of the tide must be considered.

When nearly abreast San Francisco point keep sufficiently off shore to avoid the extreme of the bank, which extends 400 yards off it. The sea sometimes breaks heavily on the banks at the entrance of the harbor, rendering it dangerous for a vessel to ground, but inside the harbor it only occasions loss of time.

Outward route.—Vessels leaving the harbor of Maranhão should get under way at high water, and when outside the bar pass northward or southward of Cerca bank, as the wind will permit. The southern of the two Espera islets, open west of the rock eastward of Medo islet, leads west of Cerca bank.

A vessel may tack as convenient whilst the yellow spot south of Pirarema point bears northward of N. 84° W. (N. 77° W. mag.), which bearing leads over the tail of Meio bank. When to the northward of this line stand toward Meio bank until fort San Marcos bears S. 18° W. (S. 25° W. mag.) and toward Almas bank until Tatinga point is in line with Raymondo, bearing S. 40° W. (S. 47° W. mag). These banks are steep-to, and the lead gives no indication of a vessel's approach to them.

Small vessels may stand across the Meio at any time of the tide, as there is never less than 12 feet water on it, but as the ebb is stronger on the western side of the bay it will be better to keep on that side. It is for the latter reason that the pilots prefer the passage west of the Meio for large vessels, although the lead is a better guide eastward of it. The parallel of the morro Itacolomi is considered as being out of the bay, and on this line the pilot leaves.

General directions.—Vessels from Maranhão and bound to Pará, having cleared San Marcos bay, and with Itacolomi light bearing S. 73° W. (west mag.), about 12 miles may steer about N. 24° W. (N. 17° W. mag.), keeping in not less than 8 fathoms water, and bearing in mind that the flood tide sets WSW. 2½ miles an hour during springs and 2 miles at neaps, and that its strength increases as the depths decrease. The ebb tide sets NE. at rather a less rate. Should a vessel be becalmed and drift into less than 6 fathoms water she should anchor. Having made good 50 miles, the course may be altered to about NW. to sight San João light, and to pass midway between it and the 1½-fathom shoal, reported to lie ENE. about 23 miles from the light. Having run about 13 miles the light or islands should be in sight.

The largest island of San João will appear in form like a white triangle, fronted by small hummocks covered with vegetation, which at a distance resemble islets; the lighthouse will be seen near its eastern end. In approaching the parallel of San João the nature of the bottom will change from white sand to yellow mixed with red specks. The lead should be constantly hove.

If the weather is hazy and the land not visible, and the vessel be in 8 fathoms water, over yellow sand, she will probably be on the flat extending from San João islands. In continuing to the northward the soundings will suddenly deepen to 16 or 17 fathoms, gray sand with black specks, and sometimes mixed with broken shell,* when a more westerly course may be steered, or along the land, keeping between the depths of from 11 to 15 fathoms.

By day the islands may be kept in sight and approached to 8 fathoms. To this depth the soundings decrease regularly, but inside this depth they are irregular, varying from 6 to 2 fathoms to the edge of the bank. In passing Pirucaua bay in 8 or 10 fathoms water the morro Pirucaua will be seen, which is the first prominent mark on the coast westward from San João. Although of small elevation it is easily distinguished in clear weather above the surrounding land. In continuing on in the same depths Pria bay will be crossed, which will be known by the Samacas islands, should the weather be too thick to see the hills extending inland from the head of Gurupi bay. Cape Gurupi will also be known by the white sand at its foot.

Between San João islands and Cape gurupi the bottom is composed of gray sand with black specks; but on the meridian of the cape it is very fine black sand, being the only bottom of the kind on the coast, and which may serve to indicate a vessel's longitude. Soon after the bottom again becomes gray sand with black specks. A vessel's position having been ascertained by sighting cape Gurupi, or from the nature of the bottom, the course may be continued to the westward, avoiding the reported position of Resolution and other shoals 10 miles northward of Carauassu island. The Punga islets will be recognized from the previous description.

---

* Lieut. de Kerhallet says black gravel and small shell, the only soundings of the kind on the coast.

On the meridian of Caïté bay the bottom is gray sand mixed with broken shell; sometimes the lead only brings up impressions of large shell. In the middle of the bay is a belt of mud extending in a NNE. and SSW. direction. The bank bordering the coast extends more to the north on the meridian of the east point of Caïté bay than to the westward. It will therefore be prudent to cross the bay in not less than 10½ fathoms of water at a distance of 8 or 10 miles from the islands. Steering to the westward, in not less than 8 fathoms water, Carro di Mato point and the sanddowns of False Salinas bay will be seen, and finally Atalaia point and lighthouse. Between Manejetuba island and Atalaia point there are occasional white cliffs.

Between San João islands and Atalaia point a vessel should not stand into less than 8 fathoms water, as in a less depth the soundings are irregular, and it is dangerous. This part of the coast is imperfectly surveyed, and should be approached with great caution, and generally not nearer than 7 or 8 miles. The deposits from the Amazons are said to form banks which in their turn are washed away again. Some of these banks are said to be found at a distance of 10 or more miles from the land. The patches of discolored water met with are not always indications of shoal water, but they should be approached with caution. The fresh water of the Amazon is sometimes seen off cape Gurupi. On a low and uniform coast like this the soundings are the surest guide, and the lead should be kept steadily going and the nature of the bottom studied.

Having sighted Atalaia point it should not be approached in a vessel of large draft nearer than 6 miles or in 10 fathoms water. The pilot schooner should be off here. If having to wait for a pilot for Pará, she can anchor in about 7 fathoms, muddy bottom, with Atalaia lighthouse bearing S. 28° E. (S. 22° E. mag.) about 2½ miles distant. From the uncertainty which exists in the positions of the shoals off Salinas bay vessels should approach with great caution.

Tides.—The tides along the coast, from the San João group to Atalaia point, are sometimes felt at a distance of 20 miles from the land. The distance to which they extend depends much upon the direction of the wind and depth of water. The streams are stronger close to the land and in shallow water; but as a general rule their influence is not felt at more than 6 or 8 miles from the coast.

The flood near the coast runs west-southwestward, towards the bays, at a mean rate of 2½ miles an hour during springs and 1¾ miles an hour at neaps. The ebb sets east-northeastward at the rate of 1¾ miles at springs and one mile at neaps.

Westward of Atalaia point, in about the track of vessels from Maranhão to Pará, the streams appear to set about parallel to the line of coast, but it is advisable to guard against an onshore set during the flood, It sometimes happens, however, during the months of March, April, and May that the strength of the ebb exceeds the flood in the same degree as the flood exceeds the ebb during the other months of the year.

The difference between the strength of the flood and ebb tides is the result of a general set to the westward of from 18 to 24 miles a day during the greater part of the year; but during the months of March, April, and May the set may be to the eastward at the same rate.

San José bay.—At about 17 miles NE. of Maranhão island is that of Santa Anna; the space between them is little known; it is nearly choked with reefs, which extend about 15 miles off shore, named the Coroa Grande banks, many of which are awash at low water.

There are intricate passages through these reefs to San José bay, which lies southward of them, and between Maranhão and the main from whence there is a dangerous and intricate channel to the anchorage of St. Luiz de Maranhão. The largest and most direct channel into San José bay is said to be near Santa Anna island. The flood tide runs at the rate of 4 miles an hour to the SW., towards the bay; the ebb sets to the NE. at the same rate.

Santa Anna island.—This island is about 10 miles in extent and covered with mangrove and other trees. The island is surrounded by reefs, on which the sea breaks, and from its NE. end they extend to the eastward in a circular form for about 9 miles. The breakers are seldom seen until the land is well in sight. The lighthouse may be seen from deck at a distance of 15 miles. A vessel having made the breakers may steer along their northern side at a distance of from one to 2 miles. The channel between the island and the mainland leading to San José bay is very little known and the flood tide runs rapidly into it.

Light.—From a cylindrical tower, painted white, situated about one mile within the east point of Santa Anna island, is exhibited at an elevation of 197 feet above high water a revolving light, showing in succession two white flashes and one red flash of equal power, with an interval of thirty seconds between the flashes. It should be visible in clear weather from a distance of 20 miles.

Tides.—Within 3 or 4 miles of Santa Anna reefs the tidal influence from rio Preá is felt; the flood sets to the SW. and the ebb NE. It is high water, full and change, at 5h. 45m.; rise on the reefs, 13 feet.

Rio Preá—Anchorage.—Within Santa Anna reefs, off rio Preá, and to the westward of Mangues Seccos point there is a capacious and secure anchorage in 5 to 6 fathoms. The best passage is between the southern extremity of Santa Anna reefs and Mangues Seccos point, passing about a mile NW. and 2 miles west from the latter; the least depth will be 19 feet. As the passage is rather intricate, and as no marks can be given, it is necessary to examine the channel before the vessel enters. The tidal streams in the entrance of the channel run at the rate of 3 or 4 miles an hour at springs.

Santa Anna reefs.—These reefs, which nearly always break, extend in a circular form from the north point of Santa Anna island to near Mangues Seccos point. Cesar bank, which is the NE. extremity of the bank, is nearly 9 miles eastward of Santa Anna lighthouse. There are depths of 4 or 5 fathoms, sand, close to the banks.

Soundings.—The 10-fathom line of soundings is irregular in its outline, but as a general rule that depth will be found at 10 miles from the coast, between Mangues Verdes point and Tutoia. The coast is fronted by a reef which extends seaward, generally from 2 to 3 miles.

Landmarks.—Viado hill, a small wooded mountain, lies inland about 5 miles within Mangues Verdes point. It is visible 18 miles. The Allegres hills, about 16 miles SE. of the same point, are visible 14 or 15 miles; these are three or four hills a little higher than Lençoes Grandes to the eastward, which extend along the coast to the rio Negro. They are of bright sand and have the appearance of linen spread on the shore, and form a useful mark for this part of the coast. It is advisable for vessels bound to Maranhão from the eastward to sight these downs before proceeding westward; but from there being no background, or anything to catch the eye, it is difficult to judge the distance from the and, and the only guide is the lead.

Immediately to the westward of Lençoes Grandes the coast trends to the southwestward and entirely changes it appearance. From being barren it becomes covered with trees and brushwood. The shore is low and called the praia das Mangues Verdes, or beach of Mangroves. The sudden transition of color between it and that of the Lençoes Grandes renders it impossible to mistake it.

The Mamelon, a small black isolated nipple hill, is remarkable; it is situated on the right bank of the rio Negro. The hill is covered with trees which have the appearance of a sloping declivity, and from a distance appears like a black islet.

Eastward of the Mamelon the shore continues to have the appearance of linen or clothes spread on it and has received the name of Lençoes Pequenos (Little Sheets) in contradistinction to the more extensive and higher range westward of the rio Negro. These downs continue along there to the Tutoia river; they are dotted with clumps of trees, the most remarkable being Matto de St. Cosme, at about 11 miles southeastward of the rio Perguiças. It appears from the offing like a black islet and is visible about 13 miles.

Cruz bank.—Off Allegres hill there exists a group of banks about 6 miles in extent and having from 3 to 8 feet water; the outer one is called Cruz bank, on which many vessels have been stranded. The NE. edge of the bank is N. 37° E. (N. 45° E. mag.), about 6 miles from Allegres hill. There is a depth of 10 fathoms at ½ mile northward of Cruz bank.

Rio Negro, a small river, lies 16 miles southeastward of the Allegres hills.

Reef.—An isolated patch of 2¾ fathoms lies N. 3° E. (N. 11° E. mag.), distant 5 miles from Mamelon hill. Between the reef and the shore the depths are from 3¾ to 4½ fathoms, with 2½ fathoms at one mile from the shore.

Rio Perguiças.—The entrance of this river may be known by a large mass of remarkable trees situated on its west bank and visible 13 miles. The east bank near the entrance is formed by a long point of sand which nearly dries at low water. The mouth of the river is obstructed by two reefs, which extend from either bank in a NE. direction and form a channel, which is divided near its outer end into two passages. Vessels drawing 16 feet can enter at high water springs. Formerly the Perguiças was much frequented, and large brigs were constructed in it, but the river has of late years been almost abandoned.

There is good anchorage 3 miles NE. of the river entrance, one mile beyond the breakers, in 3 to 4 fathoms, sand and sticky mud; good holding ground.

Perguiças reef, or Emily bank, about 3 miles long, east and west, and about 1½ miles, north and south, has from 6 to 9 feet water. Its eastern end is northward distant 5 miles from the entrance of Perguicas river. The water breaks on the reef at low tide and and during a breeze. Between the reef and the coast there is a channel of 4 or 5 fathoms depth, but having shoal patches of 13 to 15 feet water.

At 4 miles N. 18° E. (N. 26° E. mag.) of Perguicas reef lies a shoal of 23 feet, having from 5½ to 6 fathoms round it. As the extent of this bank in an east and west direction is uncertain, vessels should avoid the locality.

A shoal, with a depth of 3¾ fathoms, is reported to exist about 16 miles off the entrance to Tutoia river and about 22 miles eastward of the Perguicas.

Tutoia river is the western mouth of the Paranahiba, and the only harbor along the coast between Pernambuco and the Amazon that can be entered at all times of tide by a vessel drawing 18 feet of water. The harbor is formed between the bank which extends from the western shore and Papagaio islet, which is low, wooded, and the termination of the wooded shore; westward of it, and of the entrance to the river, the sandhills recommence.

This bank, named Tutoia reef, breaks heavily and extends to within 600 yards of Papagaio islet, leaving a channel of that width between it and Papagaio spit, with depths from 20 to 26 feet at low water.

Anchorage.—In the harbor or anchorage, which is capable of accommodating a large number of vessels, there is anchorage just south of Papagaio spit in about 4 fathoms; about 2 miles farther southward there are depths of 5 and 6 fathoms; but between these two anchorages are sandbanks, some of which dry, and must be left to the eastward. As the entrance is liable to change, and is difficult to distinguish, it is necessary to anchor outside, east of Tutoia reef, in from 4 to 5 fathoms, and examine the channel banks at low water by boat, before attempting to enter the river. This precaution is especially necessary, as at high water the sandy spit (the west point of Papagaio) which marks the eastern side of the passage is then entirely covered.

Tides.—It is high water, full and change, at Tutoia anchorage at 5h. 15m.; springs rise 12¾ feet.

Paranahiba river is one of the largest in Brazil, and in a commercial point of view is of the highest importance. It is formed by three streams of the same name that take their rise in the borders of the sierra which bounds the province of Piauhy on the SW. The first tributary is rio Bolsas, to which boats can navigate—the only one, in fact, that joins it on the left bank. Near this confluence rio Urussuhy enters it on the right bank, from the same sierra. At 84 miles further down the Gurgueia, having taken its rise in the sierra of the same name and formed in the early part of its course the lake Pernagoa, is incorporated with it.

At 108 miles lower down it receives the Caninde, which flows from the sierra dos Irmãos to the SE., and at 18 miles farther the Poty falls into it. After 132 miles of its course it is joined by the rio Longa; a little below a small arm issues from the Pernaibao to the east and forms a large lake, called Encantada, the island between it and the river being about 5 miles in length. At 21 miles farther down, near the town of Paranahiba, this river divides itself into two unequal streams, and ultimately enters the ocean by six branches, separated by a group of low islands composing its delta.

The eastern branch is named Velha d'Iguaraçu, and those following westward, the Canavieiras, or Canarias, the Meio, the Caju, the Carapato, and the Tutoia. With the exception of Barra Velha d'Iguaraçu and Barra Tutoia, which are about 40 miles apart, the other passages have become unnavigable.

The land which separates the different branches of this river is low, covered with trees, and uniform in appearance, except an occasional sandhill, which indicates the entrance of a river. The delta is almost inundated in the rainy season, except five of the islands next the sea, which are never overflowed and afford excellent pasturage for cattle; the delta forms a curve to the northward, skirted by a reef to the distance of 2 miles from the shore. The water is very muddy over ooze and sand off the delta, and at the distance of 4 or 5 miles from the land there are depths of from 8 to 10 fathoms.

It is said that for nine months in the year the land here is enveloped in haze, which, added to the heavy sea and strong westerly current which constantly prevails, renders caution necessary in approaching it. In fact, so uniform is the coast that the pilots frequently mistake one point for another.

Light.—From a lighthouse on point Pedra do Sal, at 6 miles west of Paranahiba eastern entrance, is exhibited a fixed white light, visible in clear weather from a distance of 10 miles. A reef, which dries, lies 1½ miles N. 14° E. (N. 23° E. mag.) of the point.

Velha d'Iguaraçu is obstructed by sandbanks, through which there is a narrow channel, with a depth of about 3 feet at low water, into the river. The channel, from latest reports (1876), was nearly parallel with the eastern side of Great island and marked by buoys and stakes. The changes in the position of the banks are frequent and rapid, and entrance must not be attempted without the assistance of a pilot, who will come off during ebb tide only. The sea is always heavy on the bar, especially during the ebb.

Amaracoa, one mile within the entrance, has a considerable trade in bullocks and cotton.

There is anchorage off the bar of Velha d'Iguaraçu in 4 fathoms, sand and mud, at about 1½ miles northeastward of Great island, or one mile from the breakers.

Tides.—The tides run at the rate of 4 or 5 miles an hour in the passage; outside the bar the ebb sets to the northward.

It is high water, full and change, at Amaracao, at 5h. 15m.; springs rise 11½ feet.

Coast.—The coast from Velha d'Iguaraçu point trends eastward ward for about 67 miles to Jericoacoara, and is composed of low white sand, having in the interior, here and there, clumps of small brushwood. Inland are the serra da Tiaia, the peaks of which are visible about 30 miles in clear weather; farther to the SW., and about 25 miles from the shore, are the serras Hibiapaba, 3,347 feet high, and which may be seen in clear weather; these are the last mountains in the direction of Maranhão.

Between the points mentioned are the mouths of the little rivers Timonha, Tapuiu, Camocim, etc., which may be seen in running along the coast inshore; the last of these is navigable for coasters, the others will not admit even boats. The shore is bordered by the reef, and westward of Jericoacoara, at from one to 4 miles distant from the shore, there are depths of from 4 to 6 fathoms, over ooze, sand, or broken shell. Off Jericoacoara the bottom is composed of small red and white stones, and off Paranahiba, yellow, blue, and red stones.

A shoal, with a least known depth of 2½ fathoms, lies 9 miles N. 35° W. (N. 25° W. mag.) of morro de Camocin, with a depth of 6 and 7 fathoms close-to. As the bank has not been further examined, less water may exist. The current in general sets strong to the westward.

Rio Camocim is a small river much frequented by coasters. Its entrance lies 20 miles westward from Jericoacoara point and it may be recognized by the sand hills on each side, which are visible from 13 to 14 miles.

Feijao point, the eastern point of the bight, has patches of rock lying from one to 2½ miles N. 29° W. (N. 19° W. mag.) and N. 75° W. (N. 65° W. mag.) of it and must not be passed within 3 miles.

There is good holding ground off the entrance to the river in about 4 fathoms, with Feijao point bearing S. 77° E. (S. 67° E. mag.) and Camocim point, S. 60° W. (S. 70° W. mag.).

Bar.—Sand spits and banks extend a distance of 2 miles northward of the entrance points of the river. The channel, which lies in a S. 10° W. (S. 20° W. mag.) direction, is marked by buoys or stakes. It is stated that vessels of 14 feet can pass the bar, which nearly always breaks, at high water springs. There is reported to be a depth of 3 to 4 fathoms in the river within the bar, but it is said to be gradually filling up.

The town of La Granja, of from 3,000 to 4,000 inhabitants, is situated about 15 or 18 miles up the river; formerly there was considerable trade by the river, but since the formation of sandbanks in the river it has much decreased.

Steamers from Ceara to Pará call here monthly.

Jericoacoara.—The point of that name forms in two hills; the eastern is 360 feet high, and the western 280 feet high. It is visible from the offing about 23 miles, and, at first, appears as an island.

Just to the SW. of the point is Jericoacoara basin, formed by a ledge of rocks, with which the coast is bordered. The narrow entrance in the reef is not practicable even for canoes except at high water, having but little depth and choked by weeds; inside the water is smooth. There are a few fishermen's huts here; the people live principally on the fish obtained from the lagoon at low water, when they are easily speared.

Supplies.—By remaining some days at Jericoacoara, vessels might procure cattle and poultry at a low price, by giving timely notice to enable the people to bring them to the coast, and the supplies may be depended on. No vegetables fit for eating are to be obtained; water may be obtained by digging wells on the beach.

Anchorage.—There is sheltered anchorage for small craft in about 3 fathoms, one mile S. 60° W. (S. 70° W. mag.) of Jericoacoara point, or farther in, if convenient, as the soundings diminish regularly. Landing is easily effected at high water under shelter of the point.

Tides.—It is high water, full and change, at Jericoacoara at 5h. 15m; and the spring rise is 8 feet.

Acaracu river lies about 21 miles eastward of Jericoacoara point, from off the entrance Jericoacoara hills are just seen above the horizon. The village will be seen among the trees at about 7 miles from the shore, and where the depths are about 3½ fathoms. The pilots state there is a depth of 13 feet in the entrance at high water, and 3½ fathoms in the river near the village.

Buoys.—A buoy lies in 10 feet about 5½ miles N. 4° E. (N. 14° E. mag.) of the entrance, and the channel into the river is marked by stakes.

Brazilian steamers call off the port and take nearly all the produce, which consists principally of cotton, salt fish, and maize.

Acaracu bank, composed of sand and mud, is named after the largest village on the coast off which it extends; it may be said to begin to the eastward at Patos point, from whence it gradually increases its distance from the shore until abreast of Tapage point, where there is but 4¾ fathoms at 13 miles NE. of the point; thence it lies parallel with the shore, for a distance of 10 miles, to Jericoacoara; beyond that it inclines again to the shore until off Camocim river, where its outer edge of 5 fathoms is 5 miles distant from the shore.

With a fresh wind against the tide, there is a chopping sea on the bank within the depth of 3 fathoms, and it is advisable in vessels of large draft not to sight the coast, but to keep at a distance of 12 miles from it. At this distance the tops of the cocoanut trees are only just seen in the finest weather.

When abreast of Jericoacoara, a vessel may close the land to a prudent distance; there are no dangers, and 4 fathoms water will be found at ½ mile from the entrance to the cove of that name.

Coast.—Inland, about 28 miles from the coast, are the serra Mocuripe, the eastern portion of which, named morro do Curral Grande, is 2,800 feet in height, and may be seen a considerable distance in clear weather. It appears as a double nipple hill with a saddle between.

From Jericoacoara point the coast trends easterly for 30 miles to Tapage point, which is wooded, thence southeasterly for 12 miles to the Aracati Mirim river.

The village of Almofala is situated on the bank of this river, navigable for small vessels. From the offing the steeples of the church may be seen among a group of cocoanut trees, and 2 miles eastward of the river is a pilot's flagstaff on a sandhill. At 9 miles to the eastward is the Aracati Assu, and close eastward of this river is Patos point; the river is only available for very small craft or boats. The sandhills composing the coast between are visible 12 or 14 miles. From Patos point the coast trends southeastward 21 miles to morro Melançia. The intermediate coast points are bordered by sandbanks and the reef (covered by fishing stakes) to the distance of ½ mile, increasing near Patos point to about one mile. The hills are wooded and visible from 14 to 16 miles, and there are several fishing villages along the coast.

Morro Melançia is an isolated sanddown, visible in clear weather from a distance of 20 miles. It shows white to the eastward and dark to the westward.

Mandahu.—Anchorage.—Mandahu point is encircled by a reef which extends nearly ½ mile off shore. It projects also westward of the point, forming, south of it, an excellent anchorage from 400 to 600 yards across for three or four small craft in from 10 to 12 feet of water. There is a village in the bay, which should be a prosperous one, as it has the rare advantage on this coast of having a snug little anchorage and communication with the interior by the Mandahu river, one mile to the westward, by which means the produce can be brought to the coast.

There is anchorage one mile off shore in about 4 fathoms.

Coast.—The coast from morro Melançia trends southeastward 58 miles to Ceara. Southwest of morro Melançia about 28 miles are the Uruburetama mountains. In the intermediate distance are the mouths of the rivulets, Curu, San Gonçalo, Pericuara, Cauipe, and Ceara. About 20 miles NW. of Ceara, off Os Irmãos point, a reef extends about ½ mile to the northward; also westward of this point, for the distance of about 15 miles, the shore is foul in places to the distance of ½ mile.

Anchorages.—Curumicuara point, situated 4 miles NW. of the village of that name, and about 26 miles SE. of morro Melançia, is the most salient point on this part of the coast. It is formed of sandy downs, may be recognized by the wooded conical hill 2 miles within it, named Little Mamelon. The point has a reef extending off for a short distance. Westward of the point there is good anchorage for small craft, off the mouth of the San Gonçalo, and of the village. Also about 8 miles NW. of San Gonçalo, westward of Parazinho point, there is similar anchorage in Curu bay, off the mouth of Curu river. There is also a village here.

Ceara bay.—This bay is exposed to northerly winds, and there is a constant swell from the northeastward. The heaviest sea rolls in during the months of February and March.

Mocuripe point, the east extremity of the bay, forms the end of a chain of sandhills about 230 feet high; the point, about 35 feet high, appears as a sandy cliff from seaward, and is marked by a lighthouse. A reef of rocks, some of which are uncovered, and on which the sea breaks, extends northward from the point for the distance of about 600 yards. The shore from the point curves to the southward, and then westward for about 4 miles, to a reef extending from a sandy beach, and forming what is known as Ceara bay. There are several rocky shoals in the bay, with deep water between them, all of which break at low water, and when there is a breeze. The depths in the bay are said to be decreasing and the foreshore advancing seaward.

Velha reef lies northward of Great reef, and is separated from it by a channel ½ mile wide. It is a coral shoal of 9 to 12 feet in depth, and about 800 yards long in a north and south direction and 200 yards broad. A red buoy lies about ¼ mile off its northern end.

Great reef, with a least depth of 8 feet, is situated northward of the town, and, within a depth of 12 feet, has a length of ¾ mile and a width of ¼ mile. The east part of the reef is marked by a red buoy, moored about 200 yards from the nearest breakers.

Estrella bank is of sand, has from 10 to 12 feet water, and its northern extreme lies about 800 yards distant from the coast. There is a channel between Estrella and Meirelles banks 400 yards wide, and having a depth of 19 feet.

Meirelles banks, the easternmost in Ceara bay, lie 1½ miles west of

Mocuripe point, and are formed of plateaux of coral rocks, separated by a channel 200 yards wide, having a depth of 19 feet. The eastern shoal is circular, about 150 yards in diameter, and has a depth of 6 feet. The western shoal is about 700 yards east and west, and 400 yards north and south; the least water on it is 9 feet. A white buoy is moored in 4¼ fathoms, 300 yards N. 14° E. (N. 25° E. mag.) from the center of the eastern patch.

Harbor reef, to the NW. of the landing place near the customhouse, forms, between half ebb and half flood, a shelter for boats landing.

Ceara (Villa da Fortaleza), about 2¼ miles westward of Mocuripe point, is the most important town upon this part of the coast, and contains 25,000 inhabitants. The streets cross each other at right angles, are well paved, lighted with gas, and clean; the town is generally healthy and is yearly increasing in importance. It contains a cathedral, several other churches, town hall, customhouse, and treasury, and is protected by a fort standing on a sand hill near the shore. The town has a considerable trade in cotton, coffee, sugar, hides, and India-rubber.

The United States is represented by a consular agent.

Hospital.—There is a hospital where sailors may be sent on order of consul.

Supplies.—Fresh beef may be obtained here, and provisions of all kinds; water is supplied in small kegs at 400 reis per keg; no coal.

Communication.—There is communication by Brazilian steamers with Maranhão, Pernambuco, and Rio de Janeiro. The Booth and Red Cross lines of steamers maintain communication between Liverpool, New York, Pará, and Ceara. The town is in railway communication with Quixada, a distance of 120 miles, and a further extension to Croto is in course of construction. Telegraphic communication to all parts.

Light.—On the extremity of Mocuripe point is a lighthouse 50 feet high, which exhibits, at an elevation of 108 feet above the sea, a revolving white light, attaining its greatest brilliancy every minute, and is visible in clear weather from a distance of 12 miles.

Port charges are from 110 to 130 milreis.

Pilots may be obtained by making the usual signals; they come off in catamarans, but never farther out than about 2 miles. Pilotage is compulsory except for vessels of war.

Pilotage.—Vessels of from 6 to 13 feet pay as follows: 100 to 500 tons, 30 to 38 milreis; 500 to 1,000 tons, 50 to 58 milreis; 1,000 to 1,500 tons, 60 to 68 milreis; 1,500 to 2,000 tons, 70 to 78 milreis; 2,000 to 2,500 tons, 80 to 88 milreis. Vessels from 13 to 21 feet pay: 100 to 500 tons, 39 to 46 milreis; 500 to 1,000 tons, 59 to 66 milreis; 1,000 to 1,500 tons, 69 to 76 milreis; 1,500 to 2,000 tons, 79 to 86 milreis; 2,000 to 2,500 tons, 89 to 96 milreis.

Anchorage.—Small steamers generally enter the inner anchorage by the channel, east of Great reef; and sailing vessels by the wider channel west of the same; but neither should be entered without a pilot. For steamers of greater size, the western channel is preferable on account of its greater depth, and also as it leads the vessel in head to wind, which is an advantage in so confined an anchorage. Moor in 6 fathoms, with the fort bearing about S. 11° E. (south mag.); the holding ground is good, and vessels having good ground tackle never drive.

A vessel of large draft should anchor in Ceara road in 5½ or 6 fathoms, over sandy ooze, good holding ground, with the lighthouse bearing S. 82° E. (S. 71° E. mag.), distant 2¼ miles; and sailing vessels should anchor here if the pilot does not come off at once; many vessels have been swept to leeward by the current through making too long tacks off the port. There is good anchorage in Mocuripe road, westward of the lighthouse, in from 3 to 5 fathoms.

Tides.—It is high water, full and change, at Ceara, at 5h. 35m.; springs rise 8 feet.

In the offing a current runs to the westward at the rate of 1½ miles an hour.

Winds.—During the dry season at Ceara, that is, from July to December, the winds during the day vary between east and NE., freshening considerably in midday, and replaced during the night by a light land breeze. In the rainy season, especially from March till May, the winds are light and variable, with squalls from north to west and SW. In April the squalls are said to be very heavy.

Directions.—The peak of Massaranguápe, the highest and most conspicuous of the Ceara mountains, situated about 16 miles S. 52° W. (S. 63° W. mag.) of the town, is a good mark for Ceara, from the offing.

Western channel.—From off Mocuripe point steer about N. 82° W. (N. 71° W. mag.) to pass northward of the red buoy north of Velha reef; then S. 69° W. (S. 80° W. mag.) until the dome to the westward of the town bears S. 9° E. (S. 2° W. mag.). Steer for the dome on that bearing in soundings from 6½ fathoms decreasing to 3½ fathoms, until the customhouse, which is near the landing place, bears S. 60° E. (S. 49° E. mag.). Steer for it on that bearing, and anchor in 3¼ fathoms where convenient.

There is a channel ¼ mile wide, and 4 fathoms deep, between Velha and Great reefs, but as it is not buoyed vessels are recommended to use the routes described instead of running through this channel by a bearing of Mocuripe lighthouse.

Eastern channel.—When coming from the eastward run down in the latitude of Mocuripe point, to which give a berth of ¾ mile. After passing the lighthouse it should not be brought to bear eastward of S. 82° E. (S. 71° E. mag.) until the two towers of the cathedral come in line, bearing about S. 25° W. (S. 36° W. mag.); this mark will lead about 400 yards eastward of Great reef. When abreast the buoy, or when the lighthouse bears N. 86° E. (S. 83° E. mag.) keep to the westward about 1½ or 2 points, until the window or grating of the south tower of the cathedral comes open of the west angle of the north tower. By keeping the towers in this position, a vessel will pass clear of Harbor reef. As the cathedral towers are not far apart care is required in bringing the marks on.

Coast.—The coast from Mocuripe point to the mouth of the Jaguaribe bar 60 miles to the SE. is a continuous succession of low sandy hills with scarcely a sign of vegetation. Inland are the peaks Cascarella and Azul. Southward and southwestward of Ceara are the peaks of Arantaha, Massaranguápe, and Cunhas. These mountains of Ceara form a semicircle around the town, and can be seen in clear weather 55 to 60 miles.

Caxoeira reef, about 1¼ miles from the shore, lies 8 miles N. 40° W. (N. 28° W. mag.) of cape Iguapé, and nearly midway between that point and Mocuripe. At low water, with a fresh breeze, the sea breaks on the reef; between the reef and the shore there is a channel having a depth of 3 fathoms.

At 2 miles westward of Caxoeira reef is the entrance of the Pacoti river, which is known by a large sandhill, 130 feet high, forming the SE. point of the entrance.

Cape Iguapé is a little salient, 394 feet high, and is more elevated than the adjacent land. To the westward of it is a small bay, in which anchorage in 3 fathoms, sand, may be obtained at a mile from the shore. The bay is surrounded by high, perpendicular cliffs, against which the sea breaks at half tide. Water may be obtained in this bay by digging. The coast is bordered by the reef, which has many breaks in it.

Rio Jaguaribe (Aracati).—The entrance to this river is navigable for vessels of about 10 feet draft. It is narrow and dangerous, having shifting banks of quicksand on either side, on which the sea breaks with much violence. The river, when swollen with rains, forces its way through the banks in various directions, forming new channels, so that there is no certainty of their being long in one position. In the dry season vessels may be detained here for months for want of sufficient water on the bar to leave the river.

The river widens immediately within the bar, forming a basin about ½ mile in extent, having from 6 to 14 feet water. For a considerable distance the western bank is comparatively high, but the eastern side is flat all the way to the town of Aracati; on both sides the shores are covered with mangroves. At about ½ mile southward of Sandy point, the east point of entrance, is O'Neil bank, occupying about two-thirds the breadth of the channel, with a passage eastward of it with a depth of from 2 to 3 fathoms. The bank dries at 2 hours' ebb. At 600 yards SW. of O'Neil bank is Cocoanut island, with another small island on the eastern shore southward of it. The river trends to the southward, carrying from one to 3 fathoms water for 7½ miles from its entrance to Smack point, where it curves to the eastward and thence south and SW. to the town of Aracati on the right bank, about 12 miles from the entrance.

Aracati has a considerable trade, chiefly in cotton and hides procured from the surrounding country, which are exported principally by native vessels. The town consists of one long street extending east and west, with several minor streets branching from it to the southward. The houses, unlike those of any of the villages in the vicinity, are of two stories, because the floods are sometimes so great as to render it necessary to retreat to the upper part of them. The stream abreast it is fordable at low water, and some parts of the bed of the river are dry. The population is about 6,000.

Light.—Pending the completion of a lighthouse in course of construction, a provisional light is exhibited on the headland within the bar at Rio Jaguaribe entrance. The light is a *fixed* white light, visible in clear weather from a distance of 10 miles.

Anchorage.—Vessels may anchor about one mile off the mouth of the Jaguaribe in 4 or 5 fathoms during the months of February to July, but during the remainder of the year the anchorage is not safe.

Tides.—It is high water, full and change, at Aracati at 6h.; springs rise 8 feet and neaps 6 feet.

Directions.—The land in the vicinity of Jaguaribe bar is barren; on the north side of entrance is a high red bluff, with a lighthouse, and two rocks close to the water's edge. One of the rocks has the appearance of a large gun mounted, with a small fort, flagstaff, and some huts near it. A ridge of heavy breakers, without any appearance of an opening, extends across the mouth of the river, which, with the above objects, the smoothness of the water within, and the low sandy point on the SE. side, are good marks by which the entrance may be known.

Having closed with the bar to a prudent distance, it will be necessary to obtain a pilot, or find and mark, by a buoy or boat, the deepest water in to the river which should be entered about half an hour before high water. After the outer banks are cleared the channel trends westward between the high sandy beach on the north and a bank on the south side, usually marked by perches, and which dries at 2 hours' ebb; the passage is narrow and called by the pilots the funnel.

Having passed this narrow channel, steer to the southward, with the shoal extending northward from Sandy point on the port hand. When a little past the point, haul close over to the eastern shore, the channel being between it and O'Neil bank, and where the water is smooth. The bank should be approached with caution, and the lead kept going. A vessel within the bar whose draft of water does not exceed 10 feet may proceed up at 2 hours' flood to Cook anchorage, where vessels generally load; and, by waiting for the tide, may go 2½ miles further up with safety, and take in cargo.

Sailing out of the river is more dangerous than going in, as the wind is only favorable for passing the bar during three hours in the morning, and then it can not be depended upon. Should it fail or head in the least, the vessel would be in danger, as a heavy sea is always running on the bar and the channel is so narrow that anchoring would be useless. When a vessel is through the funnel and as far down as the outer perch, and being on the starboard tack, as much canvas should be set as she can carry. No vessel should attempt to go out, if it has been blowing hard the day before, as a heavy swell will then be on the bar, and probably the breeze will not be regular.

Retiro bay, 17 miles SW. of the Jaguaribe, has anchorage in 3 fathoms, westward of Grossa or Retiro Grande, 300 feet high; or farther in if the vessel's draft admit of it, where there is smoother water, as the rocks off the point break much of the sea. Here vessels bound to Aracati generally anchor when wishing to communicate with that place. There is a house in the bottom of the bay for the accommodation of travelers, and farther up the valley are others, where probably a horse and guide may be procured. The distance from this place to Aracati is about 18 miles, and a great part of the way is along the seashore. In entering Retiro bay give Grossa point a wide berth, and steer in with a hill in the SW. part of the bay, bearing S. 36° W. (S. 48° W. mag.), and anchor when the point bears S. 31° E. (S. 19° E. mag.), avoiding Retiro bank, which extends nearly 5 miles off the shore to the northwestward.

Coast.—The coast between Grossa point and the rio Mossoro is bordered by Cajuaz bank which extends about 5 miles seaward. The shore closer in is bordered by the reef. Grossa point is rugged with a pinnacle close to its base, which, when bearing S. 69° W., (S. 81° W. mag.) will appear open. The land for 3 or 4 miles SE. of this point will appear like two steps, the lower being reddish and the upper gray. At about a mile from the point there are several rocks, the outer of which is covered at high water. Tubao hill, about 18 miles southeastward of Grossa point, is a hill of red sand terminating at the sea, and very remarkable. The rio Mossoro separates the province of Ceara from Rio Grande de Norte. Eleven miles beyond it is the village and point of Redonda. Five and one-half miles further is Mel point, composed of low red cliffs with white spots of sand on each side of them. Between this point and the shoals which border the coast here is a passage about ¾ of a mile from shore, and carrying about 2¾ fathoms of water in it. About midway between Mel and Conchas points lies the village of Rosado, marked by cocoanut trees and fronted by a reef of rocks about a mile in extent and lying obliquely with the shore. About 12 miles southeastward of Mel point is Conchas point, the western side of the entrance to Conchas river.

Rio Mossoro.—The mouth of this river is encumbered by sandbanks, leaving a narrow passage into it with a depth of 3 feet. Within the sandbanks the depths increase to 3½ and 4½ fathoms. There is a small village named Povaoção, and mount Dantas, a conical hill on the west side of entrance. Formerly a considerable trade in salt was carried on by coasting vessels, but it is diminishing on account of the bar, which is said to be gradually filling up.

In 1892 it was reported that the bar carried 13 feet water at high water springs and about 11 feet at mean high water. Vessels generally load to 12½ feet inside bar and complete loading about 3 miles outside. The pilots keep the bar staked. Vessels sail in and tow out. Rise of tide about 10 feet.

João da Cunha is a group of dangerous rocks, which only occasionally uncover, about 1½ miles in extent, with from 10 to 14 fathoms water close to, and from ½ to 4½ fathoms between them. The shoal will be observed even when covered, if a careful lookout is kept when approaching. The northern edge is 10½ miles N. 5° W. (N. 7° E. mag.) of Redonda point. There is a depth of 19 fathoms at 2½ miles north of the group, and to the southward the water gradually shoals from 12 fathoms to 3½ fathoms at a mile from the shore.

Rio Amargoso, or Assu, the principal of the several rivers on the north coast of Rio Grande do Norte, empties about 15 miles southeastward of Mel point. Its mouth is incumbered by sandbanks, with a channel over the bar, of about 5 feet, 3 miles NW. of the entrance points; inside the bar the depth increases to 4½ fathoms off Macau, beyond which the water gradually decreases to one fathom at 4 miles distance. The town of Macau stands on the right bank at about 3 miles from its mouth and at ½ mile above it is the entrance to the salt lagoons. Many parts of Brazil are supplied with salt from this neighborhood.

Eastward of the Amargoso are the mouths of the Alagados, Arrombados, and Tubarão; whilst westward is that of Cavallos and Conchas, the latter being the second in size, has a channel 3 feet deep, increasing to 7 feet between the entrance points.

Coast.—Between the entrance to the Conchas and the Agua Maré rivers, the coast is broken by several rivers and small streams, causing shallow water and numerous shoals, having from 4 to 11 feet of water on them, and extending from 3 to 4½ miles off shore. The Minhotó, a narrow ridge, 3 miles in length east and west, and having 2¼ fathoms on it, lies 6 miles from the coast, with its eastern end on the meridian of Agua Maré. About 4 miles to the westward of the Minhotó in the direction of Urca Tubarão is a sandbank apparently dry at low water.

Agua Maré river.—The mouth of this river, where five streams run into the sea, is choked with sandbanks, leaving passages into it about 3 feet deep, when it trends to the eastward parallel to the coast, for 8 miles. The entrance of this river is distinguishable from the offing by mount Mangue Secco, 6½ miles to the westward of it, which is visible in clear weather from a distance of 21 miles. The village of Agua Maré stands at the confluence of the streams at the western side of the entrance.

Coast.—Tres Irmãos point is formed of three small cliffs bordered by rocks. From Tres Irmãos to cape Calcanhar (Touro point) 31 miles to the southward and eastward, the coast is low, interspersed with groups of cocoanut trees and small villages, but with few other distinguishing objects, and is skirted at the distance of about a mile by reefs, some parts of which at times uncover. The depth of water between the inner and outer reefs is from 4 to 9 fathoms.

Santo Alberto channel.—At 2 miles westward of Tres Irmãos point is that of Santo Alberto, known by a group of cocoanut trees; they are the easternmost in this immediate vicinity, and are visible from a distance of 12 or 15 miles. Between the latter point and the inner of the numerous reefs inside the hook, or west end of the Lavandeira, is the channel of Santo Alberto, about ½ mile wide, and carrying 13 feet water. Passing inside the Lavandeira and other reefs, a steamer whose draft will admit will have no difficulty in using this channel by keeping a short ½ mile from the shore; this passage is much frequented by native vessels. Having passed through it the water will again deepen, when the vessel may proceed to the westward, or anchor off the fishing village of Caiçara 2 miles SW. of Santo Alberto point, according to circumstances, and where landing may be effected at all hours of the tide. Fowls, sheep, and fish may be purchased.

Tides.—It is high water, full and change, off Caiçara at 6 hours.

SHOALS NW. OF CAPE CALCANHAR.

Albatross shoal, with 5 fathoms water, lies in latitude 4° 55½′ S., longitude 35° 38′ W.

Urca cotia, on which the sea generally breaks, lies 27 miles N. 53° W., (N. 40° W. mag.) of cape Calcanhar and 12 miles from the shore, on the parallel of 4° 53′ S. It is nearly 3 miles in length, east and west, and one mile in breadth, with depths of 6 and 7 fathoms close around.

There is a bank with 3¾ fathoms, about 2 miles in extent, and nearly parallel to Urca Cotia, at the distance of nearly 2 miles northward.

Eastward of Urca Cotia, a bank one mile in breadth extends from it nearly 5 miles, having from 4¾ to 5¾ fathoms water over it. From this shoal to within one mile from the shore there are no other dangers, and the soundings decrease gradually from 8 to about 3¾ fathoms.

Coroa Lavandeira reef.—At a distance of 3 miles N. 64° W., (N. 51° W., mag.) from Urca Cotia is the east end of the Coroa Lavandeira Reef, having from 7½ to 9½ fathoms of water in the channel between them. This end of the reef is about one mile in breadth, thence it curves southwestward and southward for about 16 miles, increasing gradually in breadth to about 5 miles, and terminating at 2¼ miles from the coast. The eastern and western parts of this reef are reported to have from 9 to 17 feet water, but the central portion for several miles uncovers at certain times of the tides.

Between Coroa Lavandeira reef and the coast there are numerous shallow banks having about 3 to 9 feet water, with 15 feet between. Southward of these banks and close to the shore is Santo Alberto channel.

Von Roon rock.—In 1869, the German ship *Von Roon* struck on a rock having a depth of 2¾ fathoms and said to lie in lat. 4° 46′ S., long. 35° 57′ W., 5½ miles northward of the east end of Coroa Lavandeira reef. The exact position of the rock is doubtful.

Urca Conceição.—This cluster of rocks, extending east and west for 2¼ miles, in lat. 4° 54′ S., lies northwestward of the shoal part of the Lavandeira, 9½ miles from Caicara village. The Pedra Secca, a patch awash at low water, is 1¼ miles southward of it, and 2 miles from the western edge of the Lavandeira. At 3½ miles SW. of Pedro Secca is a narrow ridge named Risca das Bicudas with a depth of 2 fathoms; northwestward of which, at the distance of 2¼ miles, is a patch of 3¾ fathoms.

Urca Minoto, situated nearly 8 miles westward of Urca Conceição, is one mile in length, and uncovers at certain times of the tides. It lies about 13 miles from the coast. At one mile eastward of it is Urca Oliveira with a depth of 2¼ fathoms. These reefs generally break, but more so when the wind is from seaward.

Urca do Tubarão.—At about 11½ miles westward of Urca Minoto shoal, on the meridian of Tubarão point and nearly 12 miles distant, is the west end of a rocky shoal of the same name with 2¾ fathoms water on it, and about 2 miles in extent east and west.

Caution.—There is little to indicate a vessel's approach to the vicinity of any of these banks but astronomical observations and the soundings; the bottom is white sand, coral, and gravel. The water near the edge of the bank is green and contrasts strongly with the water outside it. The green water, unless in a small vessel bound inshore, should never be entered; the depths decrease suddenly from 18 to 8 fathoms, or less. The land being low can be seen only in fine weather from a distance of 10 to 12 miles, with the exception of mount Mangue Secco, southward of Urca Tubarão, and which may be seen from a distance of 21 miles; no vessel, unless very certain of her position, should approach it nearer than 35 miles. The current runs strong to the WNW. and NW. The rise of tide on the banks at springs is nearly 10 feet, and at neaps 6 feet.

CHAPTER V.

COAST OF BRAZIL—OFFLYING ISLANDS AND ROCKS.

St. Paul rocks (Peñedo de San Pedro), in latitude 0° 55′ N., and longitude 29° 22′ W., form a group of volcanic guano-topped rocks about ¼ mile in extent NE. and SW.; the highest rock is 64 feet above the sea, and may be seen from a distance of about 8 miles; the rocks sometimes appear like sails. They are nearly steep-to, having 47 fathoms at a little more than 400 yards from the SW. rock, and 28 fathoms at about half that distance, but no bottom with 50 fathoms at 400 yards from the northern end or on the eastern side at 150 yards. A sunken rock, with 5 fathoms or less on it, lies N. 29° W. (N. 11° W. mag.), about 100 yards distant from the southern end of the rocks.

The prevailing wind is from the SE. During fine weather there is landing in the small bay or opening between the two islets on the NE. side. This bay or cove is 56 yards across at the entrance, 100 yards deep, and has from 10 to 5 fathoms water. Fish called groupas may be caught in abundance, and sharks are numerous. An abundant supply of birds' eggs may be obtained in the season. Fresh water is not procurable.

Caution.—There is nothing, it will be observed, to indicate the approach to this remarkable group but a vessel's correct position, and although the rocks are accurately placed on the charts, yet, lying in the track of many outward-bound vessels crossing the equator, a good lookout, making due allowance for the current, is actually necessary.

Current.—St. Paul rocks are situated just within the average northern limit of the Equatorial current, where the stream sets westward at the rate of from one to 2 miles an hour. A current of 3 miles running close past the rocks was experienced by H. M. S. *Challenger*, in August, 1873, causing a confused sea and eddy race under their lee. The current is stronger in the summer than in the winter months.

Volcanic region.—Numerous instances have been reported of vessels having struck rocks or sandbanks, in the neighborhood of the equator, between the meridians of 18° and 25° W., and even as far west as St. Paul rocks. It is now known that the effects of an earthquake at sea has a similar effect on a vessel as that of striking a rock or sandbank; many cases of vessels making these reports have been investigated to confirm this.

There appears also to be an extension of this area, or else a separate area, for volcanic shocks have been felt as far as latitude 23° N. and longitude 58° W.

Fernando Noronha.—This island, in latitude 3° 50′ S. and longitude 32° 25′ W. is about 4½ miles in length, ENE. and WSW., and its greatest breadth is 1½ miles; it is hilly, uneven land, consisting chiefly of an undulating plateau from 100 to 300 feet above the sea; on its northern side is a remarkable hill named the Peak, 1,000 feet high, barren and rugged, which seems to lean to the eastward and overhang its base when bearing S. 6° W. (S. 22° W. mag.), and may be seen in clear weather from a distance of more than 30 miles. At the west point of the island is a place named the Hole in the Wall, the land being perforated.

The island is thickly wooded, but the trees are only from 6 to 12 inches in diameter, the most common being the *Bara*. On the north side, eastward of the peak, in Peak bay, is the convict village, built in the form of a square. The citadel and principal part of the village is situated on a high rock jutting out into the sea at the end of the landing place, and forming the eastern side of Water bay. Fernando Noronha has long been used as a Brazilian penal settlement. In 1884 the population consisted of 250 soldiers, 500 women and children, and 2,250 convicts, under a governor. Indian corn, cotton, and various fruits are produced sufficient for the population, though the island is capable of raising much more. The convicts are employed in cultivating the soil and in the various trades they are best acquainted with.

The wet season at Fernando Noronha prevails from March to about the middle of July, during which time it rains heavily night and day. In the first three months of the rainy season thunder and lightning are common, and heavy surf prevails, especially at Rat island. The dry season prevails during the remainder of the year, the sun being very hot in sheltered places, but tempered in the open by the sea breeze. The temperature at the anchorage (August) was 78°. It is said that earthquakes are never felt here. Rollers set in on the island, and landing is nearly always difficult.

Islets.—Off the NE. part of the island are seven islets; the largest and outermost named Rat island, has two beacons and is about a mile in length, making the whole group about 6½ miles in extent. There are also two rocks named the Brothers, uncovering at low water, about a mile from the eastern part of the island, and several along the SE. side, within ¼ mile of the shore, one of which, named Les Clochers, has a remarkable peak.

Rocks.—From Tobacco point, the south extreme of the island, a reef extends seaward more than ¼ mile; and a rocky patch, on which the sea generally breaks, lies S. 50° E. (S. 34° E., mag.) 1¾ miles from the point, with 9 to 14 fathoms between; when on the rocks the "Peak" is shut in with a high hill on the south shore. A sunken rock lies about ¼ mile off the west end of the island, and two others in a line S. 3° W. (S. 19° W., mag.) from the same point at ½ and ¾ mile distant, with 30 fathoms water between them.

Supplies.—Water is scarce in the dry season, and when procurable can not always be had from the shore on account of the surf. It is muddy and brackish, and only had near the beach. Wood may be obtained either from Rat or the main island, but there is difficulty in shipping it, and it is infested with centipedes and other insects. Milk, poultry, fruits, vegetables, and fish may be obtained in moderate quantities. Brazilian men-of-war, and on an average 10 or 12 whalers, visit the island annually to refit and procure supplies. A small steamer carries stores, convicts, and mails, once a month, to and from Pernambuco or Ceara.

Telegraph.—Fernado Noronha is in telegraphic communication with Pernambuco and St. Louis, Senegal.

Anchorage.—The roadstead is off the convict village, on the north side of the island, eastward of the Twins. Abreast the peak and citadel the anchorage is said to be quite safe during the months of June, July, August, and September, with SE. and east winds, but at other times the wind is occasionally from NE., when anchorage in or near St. Antonio bay, south of Cloven rock, is recommended. With north or NW. winds, which are occasionally felt from December to April, the anchorage is unsafe.

Rocas reef.—This dangerous coral reef extends about 5 miles in an east and west direction and 3½ miles north and south; it lies on the parallel of Fernando Noronha, and the east end is 83 miles west from the peak of that island. The reef, which dries about 6 feet, is in general level, but numerous detached rocks lie off the eastern and northeastern sides, one of which is about 12 feet above high water. Within the reef, the eastern portion is a lagoon, having from 3 to 10 feet of water at low tide, to which there is an entrance on the north side during very fine weather; the deeper parts are interspersed with patches of sand. Two islets of sand cays, about 8 feet in height, stand on the reef about one mile from its western extremity. They are about 100 yards in length by 90 yards in breadth, connected at low water by the reef, and lie north and south of each other.

On the northern islet stands an iron lighthouse, a refuge house about 40 feet high, painted white with a red roof, also several small sheds; a useful species of amaranth grows on this islet; on the southern islet are three stunted cocoanut trees, which were planted in 1857.

Light.—A white *fixed* light is exhibited from the lighthouse, and should be visible in clear weather from a distance of 10 miles.

Landing.—Heavy breakers mark the position of the Rocas, particularly at the east end, and the remains of many wrecks are scattered over the cays. There is good landing on the reef abreast and to leeward of the northern cay, from three-quarters ebb to a quarter flood, and at high water, just southward of the northern cay.

There are soundings in from 12 to 15 fathoms, rocky bottom, at 6 miles, 13 and 14 fathoms at 3 miles eastward of the reef, and from 20 to 23 fathoms at 2 miles westward; but no bottom with 30 fathoms at 2½ miles north-northeastward, nor with 70 fathoms at 4 miles to the southwestward.

Anchorage.—There is anchorage protected from the swell at about ½ mile off the northwestern part of the reef, in 8 or 9 fathoms, sand and coral; the coral is easily avoided as the bottom is plainly seen.

Current and tides.—The current in the vicinity of Fernando Noronha and the Rocas sets strong to the westward; at 2 miles westward of the latter it has been found to run at the rate of one to 2½ miles an hour. The many wrecks that have taken place on the Rocas previous to the erection of the lighthouse is sufficient to prove to the mariner the necessity of caution when in the vicinity of this dangerous reef. It is high water, full and change, at Fernando Noronha, at 6h., rise about 6 feet; and at the Rocas at about 5h. 15m., and the rise is 10 feet.

Trinidad island.—In latitude 20° 30′ S., longitude, 29° 22′ W. (approximate) is about 3 miles in length, in a NW. and SE. direction, and about 1¼ miles in breadth, it is a rugged mass of rocks, the center peak rising to 3,000 feet above the sea, and what soil there is on the island is on the eastern and southern sides. The latter is indented with small bays; but the whole shore is so iron-bound, and there is such a swell surging against it that it is almost impossible to land anywhere without staving the boat, as the shore is skirted by sharp, rugged coral rocks.

On the western side of the island there is a large arch or hole forming a natural passage made by the sea through a bluff of about 800 feet high; it is about 40 feet in breadth, nearly 50 feet in height, and 420 in length, over a depth of more than 3 fathoms; when the sea is smooth a distant rock covered with shrubs may be seen through the arch, and is extremely picturesque. There are also on the same side of the island two remarkable rocks, one called the Monument, or Nine Pin, and the other the Sugarloaf, the latter greatly resembling that at Rio de Janeiro.

The Monument is 850 feet high, of a cylindrical form, with a slight inclination, which makes it look from certain points as if about to fall. The Sugarloaf, at the SE. end of the island, is 1,160 feet high, of a conical form. The island was formerly supplied with water from two or three sources, but the springs appear to have almost dried. Vessels have occasionally anchored off the southwestern and western sides. The island was taken possession of by Dr. Halley, afterwards astronomer royal, on the 17th April, 1700, and in 1781, the English tried to form a settlement on it, but failed, and more recently the Brazilians, with like success.

In 1844 Capt. Buckle, in H.M.S. *Growler*, visited the island. He says:

"We lay-to off the east side of the island, about a mile from a sandy beach, and I landed without much difficulty on a projecting rock at the south and of the beach. From a distance it appears easy to land, but on approaching the shore we found that below the tide mark the bottom was nearly all coral rock, nearly awash for some distance, with the surf on it, which must always render the attempt to land very injurious to boats, and often dangerous. By keeping the boat's head to the swell, and watching, we effected a safe landing; but it was not without some risk that we got off again, as the water had fallen some 3 or 4 feet in as many hours, and the sea broke occasionally.

"I searched for the ruins of the settlements, but could find no traces of them; the spots where the buildings formerly stood are overrun with the castor-oil plant and coarse grass, growing on a rich mold apparently favorable for vegetation. The island must be of volcanic origin, and is similar in some respects to the higher parts of Ascension. A small stream of water descends a ravine to a small shingle beach at the SW. end of the island, but I do not trace it thither. At the period we were there, during a perfect calm, I do not think a boat could have filled water, but casks might have been rafted off.

"There was no water on the eastern side of the island, though we observed several dry watercouses. On the higher parts of the island the stems of many dead trees were scattered about, none of them more than 6 inches in diameter, and from 15 to 20 feet in length. They must have been in this state for several years, were perhaps killed by continued drought and then blown down. We saw no trace of an animal of any kind, but the footprints of a large dog, a fishing racoon, or perhaps a wild cat, close to the place where we landed.

"Several kinds of gulls and sea fowls were numerous, amongst them sea eagles, men-of-war birds, and boobies. The gulls were so tame that several were caught by the hand. One species had their nests in holes half way up the Sugarloaf, which is a truly magnificent rock. Near its base was probably the spot where the settlement was established. A few pieces of broken oars and boats, and a piece of a vessel's bulwarks, were lying on the beach. The only trace of a human habitation was a small space inclosed by a pile of stones about 3 feet high close to a detached rock about 8 feet high, which formed one side of it, and under which there was a slight hollow, which, with some kind of roofing afforded shelter for one person to lie under."

Martin Vaz islets are three small barren islets or rocks, with a few bushes on them here and there, lying north and south over a space of about 2 miles. The central and largest islet in latitude 20° 29′ S., longitude 28° 53′ W., is 300 feet high, and bears N. 87° E. (S. 76° E. mag.), distant about 26 miles from Trinidad. The two northern islets are separated by a channel about 200 yards in width, but the southern is ¾ mile distant; they are steep and inaccessible. There is a depth of 12 fathoms water at about ¾ mile S. 51° W. (S. 68° W. mag.) of the large islet; the bottom, which is rocky, is visible, and the depths decrease gradually towards the islet, to 1½ fathoms close-to. Rock cod and other fish can be caught. A sunken rock is said to lie at a short mile S. 39° W. (S. 56° W. mag.) of the south islet.

CHAPTER VI.

COAST OF BRAZIL—CAPE CALCANHAR TO BAHIA.

Cape St. Roque.—From cape Calcanhar, the NE. extreme of Brazil, the coast trends in a southeasterly direction 24 miles to cape St. Roque, a slightly projecting point of white sand, 180 feet high, having on it a few scattered tufts of brushwood. There are several small red cliffs near the cape, which show only when the sun shines on them. Between the capes the shore, which is uniform in its appearance, forms several bays, and is composed of white sandy downs, interspersed with dark green brushwood, cocoanut trees, and small villages. At a distance of 16½ miles southward of cape Calcanhar is the low sandy point of Pititinga, which may be known by a large isolated tree on its highest part with the bay and village of the same name on its north side.

The coast between Pititinga point and cape St. Roque is skirted by shoal, rocky patches, which, between 2 and 2½ miles southward of the point, abreast two small villages, extend 1½ miles from the shore; within the southernmost shoal there are depths of 1¾ and 2½ fathoms. At 2 miles northward of the village of Pititinga is the little river of Quaxinim, and at 2¼ miles farther in the same direction is the river Punahu, off which a reef extends nearly one mile from the shore, decreasing gradually towards Touro, where it extends about ½ mile. The chapel and village of Touro, 2½ miles southeastward of cape Calcanhar, stands on the north side of the river of the same name.

The coast from cape St. Roque, northward to cape Calcanhar, and from thence westward, is bordered by a bank with irregular depths and many dangerous reefs. The bank, within the depths of 20 fathoms, follows the trend of the coast at a distance of 12 to 18 miles.

Caution.—Approaching the coast of Brazil care is necessary to guard against the westerly set. During the northeastern periodic wind the set is generally very strong southward of cape St. Agostinho, and near the salient points, such as the rio Doce and capes St. Thomé and Frio, at which time it is weak to the northward.

There is often near the shore under the lee of the capes, such as south of capes St. Thomé and Frio, counter currents to the NE. Along the coast of Pernambuco there is likewise, sometimes, a counter current which sets with some force to the northward, which is often the cause of vessels when becalmed missing the land intended to be made.

Tides.—It is high water, full and change, at cape St. Roque at 4h. 14m.; springs rise from 8 to 10 feet. In the St. Roque channel the flood sets to the south and the ebb to the north, at about one mile an hour. The tidal streams are stronger close to the land and in shallow water. The distance off shore to which they extend depends much upon the direction of the wind and the depth of the water, but in general this influence is not felt more than 6 or 8 miles from the coast. The establishment of the whole eastern shore of Brazil varies but little, as the coast lies nearly in a straight line and parallel to the tidal wave which traverses the Atlantic ocean from ESE. to WNW.

Winds.—At cape St. Roque the winds are generally from SE. to east; during the southern monsoon in June, July, and August they blow from SSE. and are often very strong. As the NW. current then attains its greatest strength, these are the worst months to double the cape. In the contrary season—December to March inclusive—the breeze is moderate, blowing from east and even ENE., with a smooth sea and a weak current.

Aspect.—From cape St. Roque southward the whole coast is composed of low sandy downs, rising to a moderate height towards Olinda point, thence resuming generally its former aspect, which will be treated of hereafter. From the parallel of 20° S. or about 180 miles northward of cape Frio, as far south as the island of St. Catharina, the land is generally high, wooded, and may be seen in clear weather from a distance of upwards of 50 miles.

The Reef, a singular ridge of coral rock, borders the coast generally at the distance of from ½ to 3 miles, but in some places much farther off, and extends more or less from the NE. point of Brazil, as far as Bahia; traces of it may be found more to southward, and also along the north coast to Maranhão. The reef, which is about 16 feet in breadth at the top, slopes off to seaward, is perpendicular on the shore side, and is generally covered, but in places is nearly 3 feet out of water. It is nearly always bordered by rocky banks, and forms a natural breakwater, having smooth water and shallows inside it, with navigable channels for coasters, and where fish may be caught almost throughout the year. There are occasional openings in the reef communicating with the greater part of the ports, rivers, and creeks on the adjacent coast.

St. Roque reefs are composed of four groups of coral banks awash at low water. From near cape St. Roque they extend parallel to the coast in a NW. direction for about 23 miles, at about 3½ miles from the shore. There is an inshore passage between the reefs and the main much used by coasters. At high water with strong SE. winds the reefs break, but not at high water with east and NE. winds. Much care is required in approaching the St. Roque reefs on account of the variable strength of the current; it is rare not to see the remains of wrecks on the reefs.

Mara Cajahu reef, the southernmost of the St. Roque reefs, is nearly 5 miles long in a NNW. and SSE. direction, 2¼ miles across, and partly uncovers at certain times of the tide. Its southern extreme lies 3½ miles NNE. of the cape. From the east side of Mara Cajahu the water gradually deepens to a depth of 5 fathoms at the distance of one mile seaward.

Fogo reef, the south point of which lies 6½ miles northwestward of Mara Cajahu reef and 4½ miles eastward of the town of Fogo, is 6 miles long in a NW. and SE. direction, 1½ miles across, and partly uncovers at certain times of tide.

Pititinga channel.—For the distance of 3½ miles southward of Fogo reef there are several shoal banks. Between the southernmost of these banks and the Mara Cajahu lies the Pititinga channel, which is 3 miles wide and has depths of 3½ to 5 fathoms.

Cacão and Sioba reefs lie to the NW. of Fogo reef and are separated from the latter by Touro channel, 2½ miles wide, with general depths of 4 to 5 fathoms. Near the middle of the channel there are two patches of 2½ fathoms. Cacão is 1¾ miles long in a north and south direction and has a depth of 13 feet. Sioba is 2¾ miles long in a WNW. and ESE. direction and has a depth of 9 feet. A depth of 3¼ fathoms extends for a distance of one mile seaward from Cacão reef and 2 miles seaward from Sioba reef.

St. Roque channel, situated between St. Roque reefs and the shore, is 23 miles in length. Westward of Mara Cajahu reef there is a depth of 3¼ fathoms; the channel is, however, narrowed in this part to ¾ mile by Panca and Theresa Panca banks, which nearly dry at low water. This channel is much frequented by native vessels, as they have the advantage of a smooth sea, a tidal channel, and some sheltered anchorages. It is not recommended for strangers.

Directions.—In entering St. Roque channel from the southward the mariner should sight cape St. Roque and approach it within 2 miles, with soundings of about 5 fathoms. A vessel may then steer with Pititinga point, which has some cocoanut trees near it, a little on the port bow, taking care not to shut in Massaranguápe point, with cape St. Roque, astern. This will lead through the narrow part of the channel between Mara Cajahu reef and the main in 19 feet water. The lead will guide the vessel in keeping clear of the west side of the latter reef.

Between Pititinga point and Fogo village the channel of deepest water is tortuous, and to steer through it requires local knowledge; but a depth of 14 feet may be carried by steering N. 31° W. (N. 17° W. mag.) from a position 1½ miles east of Pititinga point, until Fogo village bears S. 76° W. (west mag.), when the channel again becomes straight; thence by keeping at one or 1½ miles from the shore a depth of 19 feet may be carried.

From the northward a vessel should sight cape Calcanhar, and approaching it on a S. 36° E. (S. 22° E. mag.) bearing the small group of cocoanut trees on Quixida will soon after be sighted, and also the two small black points of Touro; thence proceed to the southward, reversing the above directions.

Coast.—The coast from cape St. Roque trends 13½ miles southward to Genipabu Point. Three miles southward from cape St. Roque is the rio Massaranguápe, with a village and cocoanut trees on its north point of entrance. At the distance of 3 and 4 miles south of the Massaranguápe are the villages of Murihu and Jacuman. The rio Cearamirim empties at 1¾ miles NW. of Genipabu point, having a village between. The shores outhward from the rio Massaranguápe is interspersed with groups of cocoanut trees and bordered at the distance of about ¾ mile by the offlying reef. Genipabu reef lies nearly one mile eastward of Genipabu point, and a similar reef lies at the same distance from the shore about 1½ miles southward of it.

Rio Grande do Norte.—The entrance to this river is formed by an opening in the reef which covers its mouth and forms a natural breakwater. The southern ridge extends northward from the south point of entrance a distance of ¾ mile, leaving a passage having about 21 feet of water between it and the reef to the northward. Within the outer reefs a similar ridge, running in a north and south direction, rises from the bank on the north side of entrance, with its southern end bearing west from the north end of the southern ridge. Between these two ridges there extends a serpentine reef, eastward of which lies the channel to the river.

Bar.—Inside the reefs the channel is subject to great changes and is now much contracted. The bar, which has a depth of only 16 feet at high water springs, is marked by two black buoys.

The river from the entrance to abreast the town is from 400 to 600 yards in breadth, with depths of 4 to 5½ fathoms. The rio Grande is a considerable stream during the rains, but is much reduced in the dry season, and at about 3 miles above the town its course is obstructed by a sandbank having only 9 feet water. At high water the northern bank is overflowed about one mile from the mouth. The entrance is defended by fort Reis Magos, an angular structure standing in the middle of the southern reef and insulated at high water. The rise of tide at springs is from 8 to 10 feet.

Light.—On fort Reis Magos is a round tower which exhibits, at the height of 46 feet above the sea, a fixed white light, said to be visible in clear weather from a distance of 10 miles.

Natal, the capital of the province of rio Grande, stands on the eastern bank of the river, 2 miles within the entrance, and has a population of 10,000.

The United States is represented by consular agent.

Supplies.—Fresh beef, vegetables, good water, and coal may be obtained.

The exports are sugar, cotton, Brazilian woods; the imports are railroad ties and machinery.

Directions.—The land in the vicinity of the rio Grande do Norte is very low, and there is nothing to indicate the entrance to the river but the fort and lighthouse on the southern reef, which may be seen at a distance of several miles. Vessels bound for this port should make the land to the northward or southward, according to the prevailing current, waiting for slackwater to enter, as the tide runs very strong, and if care is not taken may set a vessel on the reefs.

Steer for the extremity of the southern reef, leaving it on the port hand, about 30 feet distant, and then haul to the southward to avoid the serpentine reef in mid-channel, passing between the two black buoys, when the western bank of the river must be steered for to give the flat extending from the south point a wide berth. As the channel is narrow and constantly changing a stranger should, on no account, attempt to enter without a pilot.

Coast.—From the rio Grande do Norte the white sandy shore trends to the southward 14 miles to Cotovello point. Midway is Negra point, fronted by a reef 2 miles in length and extending ½ mile from the shore; and 1¼ miles NW. of the point is a small village and a group of cocoanut trees, off which, under shelter of the point, there is anchorage for small craft, with southerly winds.

Between Negra and Cotovello points are some red cliffs, named Inferno; and between the latter point and that of Búsios, at 1½ miles to the southward, is the rio Pirangi, with a village at a little distance on either side of it. From Búsios point a reef, covered at times, with several shoals inside it extends to the northward, fronting the mouth of the river and terminating nearly 1½ miles off Cotovello point. It extends southward to Tabatinga point, skirting the shore at a distance of ½ mile. There is anchorage inside the reef, off the village north of the river, in 3½ fathoms water.

From Busios point the coast trends to the southward for 16 miles to Moleque point; and about 9 miles farther on is the bay and town of Formosa. At 7 miles southward of Busios point is the little river Camoropim, or Trahiry, with the point and village of Tabatinga 2 miles north of it.

Ponta da Pipa.—At the distance of 5 miles southward of the Camoropim river, in the bend of the coast, are a few houses with a group of cocoanut trees; and 4 miles to the southward, or one mile NW. of Moleque point, is ponta da Pipa and village. Off this point is a detached rock resembling a winepipe on its end, from which it takes its name, and is the only remarkable point on this part of the coast.

Temporary anchorage will be found NE. of the village of ponta da Pipa, but at about one mile off the point is a shoal about ½ mile in extent with 2½ fathoms water on it.

Rio Cunhahu.—From Moleque point the shore trends to the southward for nearly 5 miles to the mouth of the rio Cunhahu, with the hill of the same name on its south bank, and a village just within the entrance on its north bank. The river is entered through a break in the reef on the north side of its entrance, having 14 feet at low water. Both entrance points are bordered by sandbanks. Close north of the rio Cunhahu is Sibaluma hill, and between it and Moleque point is the rio Sibaluma.

For nearly 3 miles north and south of the Cunhahu the shore is skirted by the reef at about ½ mile off, and which at times uncovers.

Formosa bay.—From Cunhahu river the shore trends south for 3½ miles, and then eastward 1½ miles to cape Bacopary, forming Formosa bay. The town of Formosa stands on the NE. face of the cape.

Anchorage.—The bay affords shelter from southerly winds, in from 4 to 5½ fathoms.

Coast.—From Formosa bay to as far south as Traição bay, a distance of about 18 miles, the shore presents a continuous line of white sandy downs, covered at intervals with bushes; it is skirted more or less by the reef, from ½ to one mile from the shore, and which is occasionally uncoverd. Between are the mouths of the rivers Guaju and Camaratuba, the latter about 6 miles northward of Traição point, with the village of the same name standing on the north part of entrance. Between these rivers and near the coast is mount Pele, 426 feet high.

Traição (Treason) bay is formed by the point of the same name, which extends eastward more than a mile. A village stands in the bay, backed by cocoanut trees. A shoal lies in the south side of the bay. The outlying reef, which is uncovered, passes ½ mile eastward of Traição point, and runs northward more than a mile, leaving a space of about 1½ miles wide between its termination and the shoals, at the distance of ½ mile off Tamba Red cliff to the northward.

In the middle of the entrance, between the north end of the reef and the shore, is a shoal which is covered, steep-to, and may be passed on either side. The anchorage, fit only for coasters, is close inside the north end of the reef, in 2½ fathoms water.

Acejutibiro lake is 5 miles in length, and narrow, having from 4 feet to 14 feet of water. It is separated from Traição bay by a narrow neck of land north of the village. A narrow passage between Coquerinho point and the islets southward of it, at 3 miles south of Traição, leads into the lake. The village and church of San Miguel stands on its western side.

Coast.—At about 4 miles southward of Traição point is the mouth of the Mamanguápe river and 8½ miles farther south is Lucena point. Between the latter are three conspicuous, high, red cliffs named Barreiras de Miriri, which may be seen at the distance of 20 miles, and assist in identifying the entrance to Parahiba river, which is about 7 miles to the southward. From Traição point the offlying reef, more or less uncovered, trends to the southward, covering the mouth of the

Mamanguápe and passes close to the south point of its entrance, terminating at 1½ miles to the southward; it recommences about 3 miles northward of Lucena point.

Mamanguápe river is navigable for small coasters which collect the produce of the northern parts of Parahiba for conveyance to Pernambuco. The southern entrance point of the river is low, sandy, and projects to the NE., having a village and several cocoanut trees along its north side. Coquerinho (the southern extremity of the peninsula of Traição), with the village of the same name, is 1½ miles to the northward, from whence the shore trends to the west for about a mile to the entrance of a narrow passage leading into Acejutibiro lake.

Between the south side of Coquerinho point and that of Mamanguápe are several islets and shoals, leaving a channel along by the south shore into the river, the bar or entrance to which is through a narrow break in the reef northward of Mamanguápe point. The channel inside and along the reef carries from 1½ to 7½ fathoms water; between the shoals and the south shore the depth is about one fathom, but farther in the water in places deepens to 2½ fathoms.

Lucena point, at 3 miles northward of the entrance to the Parahiba river, projects seaward, with a village stretching along its north side for nearly a mile, backed by cocoanut trees.

Banks.—Lucena point is fronted by the reef, here called the Baixos de Lucena, which, after some interval, recommences at 3 miles north of that point and nearly the same distance from the shore; it extends to the southward for upwards of 4 miles, passing 1½ miles eastward of the point, and is generally covered, but on which the sea breaks. Inside the reef, surrounding the point, are several shoals.

The Parahiba river flows in the sea by two mouths. During summer the bed of the river becomes dry at 60 miles from the sea. From off cape Branco, 12 miles southward of the entrance, the country to the northward appears like two plains, which, on closing, becomes distinctly marked. The outer plain by the sea is low and sandy, but woody on its highest part; the inner one presents a series of small woody hills of a pleasing appearance. The river runs between these two plains in a NNE. direction.

Matto point, on the south side of the entrance, is low and woody, and is the extremity of the outer plain; just inside it is fort da Barra, which may be seen from the offing when southward of west. At ¾ mile west of the fort is the opposite point of entrance, formed by the second plain; it is more elevated than Matto point, and on it are some cocoanut trees. Nearly 1½ miles to the NW. is some high wooded land, on which stands the conspicuous convent of Nossa Senhora da Guia.

Extensive breakers indicate the entrance to the river, caused by the reefs surrounding it, and the shoals stretching eastward from Lucena point. The bar is buoyed about a mile from the shore, and about 17 feet can be carried over it at low water, but from the constant shifting of the sands it is necessary to employ a pilot. Vessels drawing 15 feet anchor off the town of Parahiba, but they ground there at low water. Larger vessels anchor just within the entrance of the river, off Cabedello village, in 4 or 4½ fathoms.

Town.—The town of Parahiba, and capital of the province, stands on the right bank of the river about 12 miles from the entrance. The most important public buildings are an old college, now the governor's residence, house of assembly, customhouse, a hospital, and barracks. Population, 20,000.

The exports consist of cotton, sugar, rum, woods, hides, gums, oils, and various other articles. There is steam communication from this port to Pernambuco and other ports in Brazil.

Supplies.—Fresh beef and other supplies may be obtained at a reasonable price, but vegetables are scarce. Water can be procured a little above the town from a well near the river bank.

Pier.—The Conde d'Eu Railway Company, in connection with the extension of their line, have constructed at Cabedello a large, solid pier, alongside which vessels can lie in 26 or 27 feet at low water.

Sidings connect the head of the pier with the terminal railway station in the town, so that trucks can be brought alongside the vessel; loading and discharging can be carried on from both sides of the pier simultaneously. A traveling crane is available, and vessels are in calm water at all times.

Facilities for coaling might be afforded if arrangements were made.

Light.—From a lighthouse painted red, with narrow white stripes, erected on Pedra Secca rocks, the northern extremity of the offlying reef, is exhibited, at an elevation of 52 feet above high water, a revolving white light every minute, and should be visible in clear weather 12 miles; from a distance the lighthouse appears red.

Tides.—It is high water, full and change, at Barra fort, at 5h. 0m.; springs rise 8 feet; neaps 5½ feet.

Pilots will come off, on making the usual signals; they are expert and trustworthy, and live at Cabedello village, south of the fort. A different pilot has to take the vessel up the river, which is generally done in one tide; but, in leaving, sailing vessels have nearly always to beat out, there being little or no land wind. The pilotage is 36 milreis for 11 feet, and one milreis for every foot above that.

Port charges.—The anchorage dues per Brazilian ton, 500 reis; vessels calling for supplies are exempt; hospital fees for each person, 640 reis; stamps, etc., 10,000 reis. Local regulation: Vessels must anchor at Cabedello and report at the customs offices.

Directions.—To the northward of the Parahiba there are three conspicuous red cliffs, which a stranger will probably find the best mark to indicate his approach to this river, prior to the lighthouse being seen. On account of the prevailing current, vessels should endeavor to make cape Branco; and soon afterwards the convent of Nossa Senhora da Guia, a large, dark-looking building, will be seen, surrounded by trees and apparently half way up the incline of the hill on the north side of the river. When fort da Barra is sighted bearing about west, heave-to for a pilot. At the distance of 3 miles from the reef there is a depth of about 7 fathoms water.

Tambahu.—About 6½ miles southward of Matto point is the village of Tambahu, having a road leading to Parahiba, distant 4 miles. Little or no trade is carried on here beyond building the large jangadas used on the coast as passenger boats. Off the village there is convenient anchorage for vessels wishing to communicate with Parahiba without going up the river. Tambahu will be seen at a distance, with the steeples of Parahiba appearing over the hill at the back of the village.

Anchorage.—Bring the steeples of Parahiba to bear S. 76° W. (west mag.), run in, and anchor as convenient. A berth will be found in 5 fathoms water, a mile from the reef, with cape Branco bearing S. 18° W. (S. 32° W. mag.), and the center of a group of cocoanut trees in the village S. 76° W. (west mag.). There is no danger, and from a distance of 8 miles the soundings gradually decrease from 10 to 5 fathoms nearer the shore.

Cape Branco.—From Matto point, the shore is low and woody as far as cape Branco, a well-wooded, cliffy point of white sand, about 98 feet high, conspicuous when north or south of it, but blending with the land when seen from the offing. There are several cocoanut trees on its summit, and a little southward of it is the chapel of Senhora da Peñha. The reef, more or less uncovered and broken, skirts the shore at the distance of from ½ mile to a mile, with several shoals inside it and small channels between, having 1½ to 2¾ fathoms water. At 3 miles eastward of the cape there are 6 fathoms water, sand, ooze, and corel.

Coast.—The coast from cape Branco trends in a southerly direction for a distance of about 20 miles to Coqueiros or Guia point, which will be known by its being salient or projecting seaward, whilst that of Petimbu, north of it, is steep. At 9 miles south of Coqueiros is Pedras point, with the Goiana river between, and 4½ beyond Pedras is Catuáma bar, at the north end of the island of Itamaracá. The coast all along presents sandy beaches, now and then intercepted by perpendicular red cliffs, from 20 to 60 feet high, and the mouths of several small rivers. It continues to be skirted by the reef, but which is much broken from cape Branco southward, and in many places disappears.

Near the rio Abiahi the reef rises after some interval, again becomes more regular, and is uncovered at times; northward of its recommencement there is indifferent anchorage, with southerly winds. From this part of the reef to as far south as Goiana bar it is bordered by banks at a distance of about one mile, having over them from 2 to 2¾ fathoms water; and off the Goiana river the offlying reef is 3 miles from the shore. Inside the reef there are numerous banks, which renders the navigation impracticable to any but small coasters having local knowledge.

To the northward of Pedras point is mount Almescar, which is isolated; more to the southward is that of Itapessóca, with a large quantity of cocoanut trees at its northern extremity; and south of it is mount Campiro, on which there are also cocoanut trees, with an isolated one in the center; and between the two mouths a deep valley.

Petimbu, or Port Francez, between Petimbu and Coqueiros points, has room for a few small vessels; the greater part of the space inside the reef is encumbered with sandbanks, and the bottom indifferent.

The entrance to the port is through an opening in the reef, about 43 yards in breadth, with 4 and 3 fathoms water, over fine sand. The reef which borders the entrance has from 2 to 3 feet water over it. At a little distance from the reef, on the north side, are seen two heads of rocks which uncover at low water spring tides. During summer port Francez affords good shelter for coasters; but in the winter, as the reef is uncovered but little, and that only at the time of spring tides, the SE. winds which blow during this season cause much sea. The village of Petimbu, with its church, stands in the bay.

Caution.—The position of port Francez is somewhat uncertain. This applies to the other small ports along this portion of the coast.

Les Tacis reef.—Eastward of the reef which borders Coqueiros point, at the distance of 2 miles, is the rocky bank named Les Tacis, which extends in a southerly direction from the entrance to port Francez, parallel to the reef for a distance of about 3 miles, and as much as one mile seaward of it. The reef north of the entrance is bordered by a similar bank extending about ½ mile.

Directions.—Port Francez will be readily known by a steep, rocky, well defined coast, of from 25 to 30 feet high, near Petimbu, and from the land to the northward near the mouth of the Abiahi river being lower. Coqueiros point has a large plantation of cocoanut trees on it. When the southern extremity of the high part of the rocky shore in the middle of the bay bears S. 68° W. (S. 82° W. mag.), and the rocky shore north of it N. 68° W. (N. 54° W. mag.), a vessel will be in the fairway of the entrance.*

Goiana river.—The mouth of this river, 300 yards wide and having from 2½ to 3 fathoms of water, lies between Coqueiros and Pedras points, but nearer the former. The river is winding and falls rapidly, but is navigable for small vessels for about 10 miles, where there is one fathom water. The town of Goiana is about 12 miles from the sea, and here the river trends northward for 9 miles farther. It receives the Tracunhaem from the SW. and the Jacare or Capibaribe-merim from the NW.

***Wreck.**—A wreck has been reported about 10 miles off Pedras point and about 35 miles northeastward of Pernambuco, in about 15 fathoms, and with two masts showing above water. (1887.) Position, as given: Latitude, 7° 34′ S.; longitude, 34° 36′ W.

NOTE.—The wreck presents a danger to shipping, and as the exact position is not known, mariners are cautioned accordingly.

The entrance is approached through a break in the reef, from 30 to 35 yards wide, with a depth of 1½ to 2 fathoms at low water springs. The reef to the northward uncovers at a quarter ebb and shows several heads of rocks; that on the south is uncovered about 3 feet at low water springs. The channel between the banks inside the reef leading to the anchorage has about 2¾ fathoms water over sand and gravel.

Directions.—Vessels bound for the bar of Goiana from the northward should make Coqueiros point, and steer to the southward until Guagiru point, which is sandy and covered with cocoanut trees, at the north side of the river is seen, and which will also be known by some mangrove trees, separated in the middle, farther south.

Keep an isolated tree on mount Selleiro open of Pedras point until the mouth of the river is seen; the fairway of the bar lies with Guagiru point bearing west (N. 76° W. mag.), and which may be steered for on that bearing. In proceeding for the mouth of the Goiana, steer about S. 44° W. (S. 58° W. mag.), between the banks for about 2 miles, or until Guagiru point bears N. 45° W. (N. 31° W. mag.), when a course N. 57° W. (N. 43° W. mag.) will lead between the banks to the anchorage, which is near Guagiru point, in 2½ fathoms coarse sand.

In coming from the southward a vessel should make and pass 3 miles eastward of Pedras point to avoid the reefs, extending nearly that distance, until Guagiru point is seen. When approaching the entrance, the tree on mount Selleiro should be kept open, and then proceed as in coming from the northward.

This and other small rivers along the coast are only available for coasters, and with local knowledge.

Rio Megaho.—The mouth of this small river leading to the lake of Tejucupapo, lies about one mile southward of Goiana and within the bar of that river. It is about 140 yards in breadth, which it preserves for about ¾ mile; it has 2¼ fathoms at its mouth, and is navigable for small craft to 4½ miles from the entrance, when the depth decreases to about 3 feet.

Pedras point is conspicuous, with a village and church on its south side. At 4 miles SW. of it is Funil point, near which is the village and anchorage of Catuáma. Between the two points the reef and sandbanks extend off shore a distance of 3 miles.

Gerimum bar.—At the distance of 2 miles S. 36° E. (S. 22° E. mag.) from Pedras point is the small bar of Gerimum formed by a break in the reef northward of Catuáma bar; it is more than 200 yards in breadth, with 3 to 4 fathoms water, over coarse sand. The reef on the north side of the entrance has about 10 feet over it at low water; that on the south has about 7 feet over it, and extends with a chain of rocks in a westerly direction. Within the entrance there is good anchorage in 2¼ to 2¾ fathoms water, coarse sand; but the space is narrow and the shore should not be approached too near, as it shoals suddenly. The narrow channel between the banks leads to an inner anchorage named Poco.

The space between the reef and the coast from Pedras point to that of Funil, is filled with banks, leaving a narrow channel between them and the reef, with one to 2¼ fathoms water, which leads to Catuáma bar. The bank outside the reef, which here terminates, leaves a clear space south of it, and near which there are from 5½ to 6½ fathoms water.

To cross Gerimum bar, proceed as for that of Catuáma, and steer to the northward along the edge of the barrier reef, in 5 to 4 fathoms water. When the highest part of Itamaracá is in line with the middle of the hill of Jaguaribe, which resembles a bowl, and the cocoanut trees near Catuáma are on with those of mount Carrapixo, steer S. 88° W. (N. 78° W. mag.), for the middle of the bar, which lies with Pedras point bearing N. 24° W. (N. 10° W. mag.), and Funil point S. 76° W. (west mag.)

Catuáma bar.—At the northern extremity of Itamaracá island is Catuáma bar and channel, formed by the coast trending westward and southward around the island, and by the reefs stretching from the island and shore for a distance of 3 miles to seaward. The channel leads to the rio Tejucupapo and others on the main, and through the arm of the sea about ½ mile in breadth, which separates the island from the mainland, passing out at Ilha bar. The channel between the banks leading from the bar to the anchorage is rather narrow, with from 2 to 4 fathoms water, sandy bottom,

Anchorage.—The anchorage at Catuáma occupies a space of 1½ miles in length, and about ⅓ mile in breath, north and south; and lies between Funil and Atapuz points on the main, with depths of 3½ to 5½ fathoms, over coarse sand; near Funil and Selleiro points the bottom is mud and gravel.

Within the entrance reef on the northern side is a rock named Gostoso, with 10 feet of water over it, which may be avoided by keeping Funil point northward of a N. 75° W. (N. 61° W. mag.) bearing. Outside and near the reef on south side of entrance is Jaguaribe rock, with 2¼ fathoms over it. There is also another rock near Funil point, which uncovers with the banks forming the channel, at certain states of the tide.

Directions.—The position of the bar of Catuáma will be known by mounts Funil and Selleiro, on which there are some cocoanut trees. In approaching it keep at a convenient distance from the reef, and with mount Funil bearing N. 57° W. (N. 43° mag.) it may be steered for until Pilar point bears S. 22° W. (S. 36° W. mag.). In this position a vessel will be on the bar, with a depth of about 13 feet, about 100 yards from the north and south points of the reefs, and which never uncover.

The banks on each side of the channel to the anchorage are uncovered at half tide, and on which the sea breaks at high water. The least depth is about 1¾ fathoms, but within the line of Pedras and Pilar points it increases. The channel is narrow and the rocks previously mentioned must be avoided. *Local knowledge is indispensable.*

Rio Macaranduba.—This little river opens between Funil and Selleiro points northward of the anchorage of Catuáma. It has from 3½ to 4 fathoms at low water, over sand and mud, and is navigable for large boats. Its mouth is narrowed by rocks, beyond which it opens out to 260 yards.

Rio Tejucupapo.—The mouth of this small river, 328 yards wide, with depth of 3 fathoms, is formed between Selleiro and Atapuz points, westward of Catuáma anchorage. It leads to the village of the same name at 9 miles up, and to port Ilhota.

Itamaracá island.—The shore of this island is planted with cocoanut trees, among which are whitewashed dwellings and the cottages of fishermen. The island produces cotton, sugar, and rum; there are also extensive salt works formed on the sand, which are overflowed at high water. At 2 miles southward of the mouth of the Jaguaribe, at the north end of Itamaracá, is the village of Pilar; further to the southward is that of Bom Jesus; and at the SE. extreme of the island is a fort.

The small river Jaguaribe is important from its commerce in salt, procured from the extensive salt works on the east side of the island, and which commences at about one mile within the entrance. It is narrow, runs to the southward for about 3½ miles, and carries from one to 3½ fathoms water, with several holes or wells.

The south point of Itamaracá island terminates in a tongue of sand which extends in a NE. direction for about ½ mile, and joins the extensive bank named Macaco, fronting this end of the island. The reef fronts the island at a distance of about 1½ miles, and uncovers at low water from Catuáma bar to some distance southward of Pilar village, when it becomes covered, and continues so until southward of Ilha bar.

The rocky bank, with 2 and 3 fathoms water on it, continues to border the reef at a distance of about 2½ miles from the land, and terminates at the north side of Ilha bar.

An isolated bank one mile long, with a depth of 1½ fathoms, lies on this southern edge, with the fort bearing S. 59° W. (S. 73° W. mag.), distant 3 miles; between this bank and the reef there is a depth of 3 to 4 fathoms; from thence to the island the space is obstructed by sandbanks.

Ilha bar.—This bar is a little northward of the parallel of Fortaleza fort, at the south end of Itamaracá. Its position may be recognized by Selleiro and Funil hills to the northward, and by the fort at the entrance, which may be seen from 6 to 8 miles. The entrance is more than ½ mile wide, with 7 fathoms water outside and 4½ fathoms water between the entrance points of the reef, over coarse sand. On the south side of entrance the reef uncovers, and a little northward of it is a depth of 7 feet at low water; on the northern reef there is 10 feet.

Within the reef, on the south side, is a shoal of coarse gravel and stones, which renders it necessary to keep on the north side of the entrance. Within the northern reef is a chain of rocks running north and south which uncover, leaving between them and the reef a passage having 7 feet water, leading to the channel of Poco, where there is anchorage for small coasters.

The channel inside the bar is formed by banks of sand on either side; it leads to the anchorage of the port of the island, and carries from 2¾ to 3½ fathoms water, over sand, but it is narrow and there is not room for any vessel to work out; the deepest water is on the south side. The navigation is easy, as the sea breaks on the banks at high water, and at a quarter ebb they uncover and show the limits of the channel. The soundings from abreast the fort to Itapiçuma village are from 3 to 3¾ fathoms, and at the SW. end of the island the depth is 2½ fathoms, with 3 fathoms near the main, sand and mud. The rise of tide is said to be about 9 feet.

Anchorage.—There is good anchorage from ½ to one mile westward of the fort, and eastward of the village, in from 3½ to 4 fathoms; small craft can continue on to Itapiçuma.

Directions.—With the fort bearing S. 74° W. (S. 88° W. mag.), distant 3 miles, and Pilar point N. 33° W. (N. 19° W. mag.), there is a depth of 4¾ fathoms; from thence a course S. 88° W. (N. 78° W. mag.), one mile (or until Pilar point is in line with mount Selleiro), leads close northward of the southern reef, thence a course S. 63° W. (S. 77° mag.) will lead about mid-channel between the sandbanks.

The channel, or arm of the sea, which separates Itamaracá island from the mainland, is navigable for small vessels. In the northern part it is narrowed by two mud islets which lie in the middle, with a channel of about 300 yards on either side. The greatest depth is on the island side, where there are from 2¾ to 5½ fathoms. At the south end of the islets is the mouth of the rio Araripe. It is more than 6 miles in length, and about 260 yards in breadth at its mouth, and is navigable for 3 miles, with 3½ to 3 fathoms water at that distance up, where the depths diminish to its extreme.

Southward of the Araripe is that of the rio Congo, or Tomba-as-Aguas. It is navigable for small vessels for a distance of 1½ miles.

Southward of the Congo, for a distance of more than a mile, the depths in the channel gradually decrease to about one fathom; here the tides from Catuáma and Ilha bar meet, which no doubt is the cause of the accumulation of sand. At about 3½ miles southward of the Congo stands the church dedicated to St. Gonsalo, and the village of Itapiçuma, where there is a considerable trade in sugar.

The village, extending about a mile north and south, stands on a low plain. The mouth of the Iguaraçu river is narrow and lies on the main nearly opposite the ancient village of the Island of Itamaracá. It is navigable for small vessels for a distance of 2 miles, carrying from one to 2 fathoms water; beyond which it is incumbered with shoals. At 4½ miles from the sea is the town of the same name.

Rio Maria Farinha, about 2 miles southward of Itamaracá island, trends to the south and SW. for a distance of 3 miles, carrying from 1½ to 4 fathoms water, when it divides into two branches, the Maria Farinha continuing to the southward and the Inhaman, the other branch, trending westward. The Maria Farinha is about 195 yards in breadth at its mouth, and has a considerable trade in white chalk, which employs a large number of boats.

The bar, formed by a small opening in the reef, lies 1½ miles S. 4° E. (S. 10° W. mag.) of Ilha bar. The narrow channel, running about W. by S. from the bar, and carrying from 9 to 3 feet to the entrance of the rio Farinha, is formed by sandbanks on either side. There is also a narrow passage between the reef and a ridge of rocks inside and parallel to it, having from one to 1½ fathoms water over coarse gravel, which leads to the channel from Ilha bar.

The mouth of the river will be known by its south point of entrance being sandy, a little elevated, covered with cocoanut trees, and well detached from the opposite shore, which is high and continues so to Ramalho, the point south of Itamaracá. At a little more than 2 miles southward of the bar of Maria Farinha is that of San José; the space between, inside the reef, is filled with banks, some of which are uncovered.

San José bar.—The position of San José will be recognized by the three churches in the locality: that of Conceição near the shore; San José on the higher land; and the convent of San Bento on a hill of the same name more in the interior. The reef between Ilha bar and that of St. José is fronted at the distance of a mile by a rocky bank, with 2 to 3 fathoms water 4 fathoms inside, and 6 to 7 fathoms at ½ mile outside.

San José anchorage is formed by the points of Maria Farinha and Leitão. The reef, which passes at a distance of nearly 2 miles, has an opening about 38 yards in breadth, with nearly 4 fathoms water, between the two heads of rock, which diminishes to about one fathom at ¾ mile from the shore. The reef being low, winds from ENE. to ESE. cause a heavy sea, rendering the anchorage here much exposed.

The bar lies with the church of Conceição bearing S. 64° W. (S. 78° W. mag) and the fort at the south end of Itamaracá N. 46° W. (N. 32° W. mag.) From the rocky heads on the south side of entrance a chain of rocks partly uncovered extends toward the shore. In running along the land at the distance of 4 miles for the bar of San José, the forts of Pao Amarello and Itamaracá will be first seen, then the different churches. Care should be taken to pass the bar nearer the rocks on the north side of entrance than those on the south.

Coast.—From Itamaracá to the southward the coast is composed of low, cultivated woody hills, with cocoanut trees and several villages.

From fort Pao Amarello southward to Olinda the land increases in height. The shore presents a sandy beach, and from the north end of Itamaracá it may be said no part of it is free from breakers, although interrupted in places.

Leitão point, has a church ½ mile south of it, and 2 miles beyond the point is fort Pao Amarello. About 2 miles south of the fort is Quadra point, forming a little bay between. At one mile from Quadra point is the mouth of the rio Doce, and at nearly 4 miles further on is Olinda point, with the rio Tapado 1½ miles to the northward.

The reef, which is uncovered as far south as Quadra point, there becomes covered, more broken, and runs to the southward, having from 7 to 20 feet water on it. The bank continues to border the reef at about 1½ miles from the coast, extending SE. of Olinda to a distance of 2 miles.

The space between the coast and the reef has depths of from one to 4 fathoms, coarse sand; but as the reef has so much water on it, there is here a heavy sea, caused by the swell from the offing. There are two or three patches of rocks nearly midway between the coast and the reef, extending from a little northward of the rio Doce for 1¼ miles to the southward, with about 6 to 9 feet water on them.

Fort do Pao Amarello, or Yellow wood, is known by a break in the land, which looks like the entrance to a large harbor. Coasters of 6 or 7 feet draft can cross the bar at high water and pass inside Olinda reef and banks to Pernambuco.

Rio Doce is navigable for small coasters only; its mouth is about 16 yards wide.

Pao Amarello bar lies with the fort bearing S. 55° W. (S. 69° W. mag.). It is narrower and not so deep as that of San José, but the reef is here higher and the anchorage inside is more sheltered. Between the entrance reefs there is 4 fathoms water, sandy bottom. Inside, the water shoals and it is incumbered with banks. Within the southern reef there is anchorage in 2 to 3 fathoms, coarse sand and gravel, between Rapa bank, having about one foot water on it, and the reef. The space is limited, there is not room to swing, and it is necessary to make fast to the reef.

The fort Pao Amarello, with the convent of San Bento on the hill to the NW. of it, are good marks for the bar. At the distance of 4 miles from the shore, bring the fort to bear S. 55° W. (S. 69° W. mag.) and steer for it; when Maria Farinha point bears N. 30° W. (N. 16° W. mag.) a vessel will be at the middle of the bar, and having passed it, may anchor inside in 2 or 3 fathoms water, keeping Olinda point open; or more shelter will be found to the southward, between Rapa bank and the reef.

Olinda point.—The town of Olinda stands a little south of the point on the most elevated land in the vicinity of Pernambuco, and is remarkable from its white houses and churches, interspersed with trees.

Northward of Olinda the land is moderately high, nearly level, and covered with brushwood. The point is bordered by extensive reefs, with breakers stretching seaward nearly 2 miles. The shore from thence curves to the southwestward for about 2½ miles to fort Brum at the entrance to Pernambuco.

Light.—On the old fort of Montenegro on Olinda point is exhibited an intermittent white light, fixed 30 seconds eclipse 5 seconds; flash 3 seconds; eclipse 5 seconds, visible in clear weather from a distance of 12 miles.

Buoy.—A white buoy lies in 5 fathoms off Olinda reef, at 2400 yards S. 14° E. (south mag.) of Olinda lighthouse, and in clear weather may be seen from a distance of 5 or 6 miles, but its position is not to be depended on.

Pernambuco, the capital and principal seaport in the province of the same name, is situated at the mouth of the rio Biberibe. It stands on a flat, and is divided into three parts. Recife, or Pernambuco proper, is built on the peninsula formed by the rio Biberibe, which extends southward from Olinda, and is the most mercantile part of the city. Santo Antonio stands upon an island, or sandbank, formed by the arms of the Capibaribe, and connected with Recife by a long stone bridge. The third division of the city, named Boa Vista, is on the mainland westward of Santo Antonio, and joined to it by a wooden bridge.

The population of Pernambuco and its environs is 130,000. Its commerce is important; the exports consisting chiefly of cotton, sugar, rum, hides, and dyewoods; and the imports of cotton and linen cloths, hardware, cutlery, silks, wine, flour, salt fish, etc.

The United States is represented by a consul and vice-consul.

Communication.—Pernambuco is connected by telegraph with the principal ports in Brazil, and by submarine cable with Cape de Verde islands, Madeira, and Lisbon. Several lines of mail steamers, including the Pacific Steam Navigation Company and Royal Mail Company call here.

The Reef in front of Pernambuco, which forms the harbor, runs in a straight line along the shore from the southward commencing at Boa Viagem point, and terminates abreast fort Brum on the peninsula, which commands the entrance to the harbor. Near the extremity of the reef is a small octagonal fort named Picão, and 50 yards northward of the fort is the lighthouse. From the extremity of the reef, shoal water—interspersed with patches of rocks which have a depth of 6 feet—extends from the lighthouse nearly ½ mile in a northeasterly direction.

The Great passage, leading into harbor, is northward of the shoal extending from the lighthouse, and has a depth of 3¾ fathoms at low water.

The Poco, or well, which forms a part of the Great passage into the harbor, has a depth in the center of 20 or 24 feet shoaling towards the shore, and is partially protected by the shoal extending from the lighthouse. Here vessels of more than 13 feet draft lighten to go in side, and also take in the last part of their cargoes.

Picão passage.—Close northward of the lighthouse is Turtle rock, steep-to, which forms the south side of the Picão, or Little passage. Steer in with the two south turrets of fort Brum in line, and haul close round Turtle rock and along the reef until 200 yards from the lower tier of shipping, then drop the anchor and wait for orders from the harbormaster.

Harbor.—Vessels lie sheltered in the harbor of Pernambuco four and often six in a tier, and moored parallel to the reef. The water is nearly always smooth, except at high water springs, when the sea runs over the reef, causing a swell, and with strong sea breezes the vessels roll and strain considerably, but this lasts only for about two hours at each high water springs. Vessels drawing 19 feet can enter the harbor at high tide.

Buoys.*—A buoy, painted black, marks the extremity of the shoal water extending from the lighthouse, also the south side of the Great passage. A buoy, named Cabeça de Coco, painted red, marks the southern extremity of a shoal which breaks at low water, off fort Buraco, on the north side of the Great passage. The English bank is marked on its north end by a buoy painted in red and white vertical strips, and on its south end by a red buoy. Two red buoys mark the direction of the telegraph cables. The spare telegraph cables of the Western Brazilian Telegraph Company are marked by a buoy in lat. 8° 6′ S., long. 34° 49′ W., and another buoy S. 4° E. (S. 10° W. mag.) 15 miles from it.

Pilots.—Vessels visiting Pernambuco with the intention of going into the harbor will find it preferable to keep under way, standing off and on, guarding against the current. Pilotage is compulsory, taken on the draft of water and tonnage. A harbor launch and crew are provided if necessary, which, when employed, must be paid for in addition to the pilotage. Application for pilots is made at the arsenal.

Port charges.—Towage in and outward the same, but not compulsory. For the first 100 tons (American), 30 milreis; for each ton in excess of 100, 100 reis; light dues on vessels of 400 to 700 Brazilian tons, 40 milreis; over 700 tons, 50 milreis; fort pass, 6 milreis; hospital dues on vessels with three masts, 6 milreis; for each of the crew, 640 reis; stamp duty on outward freight to foreign ports on each 1,000 milreis, 4 milreis; wharfage at customhouse wharf or bonded warehouse, per meter of length, 400 reis per day; water, for a load of 1,600 gallons, 50 milreis.

---

*All the buoys have been withdrawn and vessels are not allowed to enter the port, or to load or unload, after sunset.

The Authorities are commanding officer of the naval arsenal and president of the province.

Saluting must be done in the outer roads.

Supplies.—All kinds of supplies are to be obtained at Pernambuco. Prices are moderate. The water is of good quality and can be gotten on board easily; price is the cost of delivery.

Coal.—From 3,000 to 6,000 of coal are kept in stock; vessels in the harbor may be coaled at the rate of about 450 tons per day, and in the road by lighters at the rate of 100 tons. The roadstead is not a desirable place to coal from or to remain in longer than necessary, especially at the change of the monsoons.

Semaphore.—There is a semaphore station just across the river from the customhouse, on top of a church tower.

English bank, with 16 feet over it at low water, and on which the sea breaks heavily with a SE wind, lies north and south, and within the depth of 3 fathoms is ⅓ mile in length and ¼ mile in breadth. From the center of the bank the lighthouse bears about S. 76° W. (west mag.), distant 1,600 yards. The 5-fathom edge of the bank extends about 400 yards north and south respectively of the buoys.

At ¼ mile eastward of the south end of English bank is a patch of 3½ fathoms.

To pass northward of the bank keep the highest church in Boa Vista open to the northward of the lighthouse. The southern turrets of fort Brum, shut in or open south of the lighthouse, lead to the southward of the bank. Between the bank and the reef extending north of fort Picão is a channel ½ mile wide, with 5 fathoms water. The pilots state that this bank is increasing.

Vettor Pisani bank.—A bank having a depth of 4 fathoms, rocky bottom, has recently been found in the outer road during an examination made by the officers of the Italian corvette *Vettor Pisani.* From the center of the shoal, which is apparently of small extent, Olinda lighthouse bears N. 11° W. (N. 3° E. mag.) and Picão lighthouse S. 87° W. (N. 79° W. mag.), distant about 1¾ miles.

Fort Picão, in line with fort Brum, leads nearly 800 yards south of the shoal, which should be avoided when there is a heavy sea.

Ituba bank.—This bank, also reported by the *Vettor Pisani*, has 3¾ fathoms water, and lies with Olinda lighthouse bearing N. 3° E. (N. 17° E. mag.), Picão lighthouse N. 25° W. (N. 11° W. mag.), and Lazaretto or Quarantine house S. 82° W. (N. 84° W. mag.).

About 1,600 yards SW. of Ituba shoal there is a similar shoal of 4 fathoms.

Afogado bank.—At about 1¼ miles southward of the lighthouse a rocky bank of 3 fathoms and less, named Afogado, extends nearly ¾ mile from the shore; thence it trends southward parallel to Pernambuco reef.

Light.—On the extremity of the reef at 50 yards northward of fort

Picão, on a rock covered at quarter flood, stands a white octagonal tower, which exhibits a revolving light, showing 2 white flashes and one red flash in succession every minute; but is reported to be irregular in its action. The light should be seen in clear weather from a distance of 15 miles.

Tides.—It is high water, full and change, at Pernambuco, at 4h. 45m.; springs rise 8 and neaps 6 feet.

Anchorage.—Vessels may anchor anywhere southward of the south buoy on English bank, giving it sufficient room, in 6 or 7 fathoms water, sand, shell, and patches of coral, at a mile or more from the lighthouse, but not with it to the northward of N. 37° W. (N. 23° W. mag.), as within that bearing the bottom is rocky. The best holding ground in the roads, and clear of old anchors, is about midway between the lighthouse and the south buoy on English bank, in 5 or 6 fathoms; this is also a good position for communicating with the shore by boats. If intending to go into harbor be ready to get under way at three-quarters flood.

This roadstead is by no means a desirable place for vessels to remain longer than is necessary, particularly at the change of seasons, and the seaman should be prepared to weigh or slip should it come on to blow. Commander James S. Thurburn, R. N., says, "During August, I scarcely know of one vessel lying in the roadstead which did not loose her anchor."

Vessels visiting this port for any time should go inside the reef, as the expense of pilotage will soon be liquidated in the saving of the wear and tear of boats, and in the straining of the vessel, rigging, etc. During yellow fever season vessels must remain outside the reef.

Caution.—The sea breaks heavily on English bank, with the wind from the SE. quarter, the same as on the Olinda and other reefs. Open boats should be careful, as accidents have occurred by boats getting too near the breakers.

Directions—Vessels approaching Pernambuco from the northward should, from October to January, make the land northward of Olinda, and in passing the point give it a berth of 3 miles, the reef in many parts being steep-to, and keeping in not less than 10 fathoms water, for within that depth the soundings are irregular. The mark to clear Olinda reef is a church with two steeples a little northward of the largest church in Santo Antonio, open southward of Picão lighthouse, and at night do not bring the light southward of S. 63° W. (S. 77° W. mag.).

From March to September vessels should make cape St. Agostinho, and proceed along the coast to the northward at the distance of about 3 miles, when Olinda will be seen. The convent of Nossa S. dos Prasêres with its two towers is a good mark for the coast immediately south of Pernambuco. In closing the anchorage, Olinda lighthouse should not be brought to the eastward of N. 14° W. (north mag.) until

Picão lighthouse bears about N. 46° W. (N. 32° mag.), when it may be steered for, and there will be from 8 to 6 fathoms water to the anchorage. At night, Picão light should be kept between the bearings of N. 46° W. (N. 32° W. mag.) and N. 78° W. (N. 64° W. mag.), which leads clear of and between Ituba and Vettor Pisani shoals. Allowance must always be made for the current, which sets strong, according to the monsoon.

Proceeding into the harbor, pilots do not use Olinda channel, but pass southward of English bank, and from thence steer for Great pass, between the white buoy on the south side of the pass and a red buoy on the north side.

Coast.—Pina point, at about 2¼ miles southward of Pernambuco lighthouse, is the extremity of a tongue of land projecting northward inside the reef, having some banks off it which uncover. The reef, uncovered and broken in places forming small bars, commences at Boa Viagem at 3¾ miles southward of the point, it extends northward to the lighthouse and lies parallel to the shore, at a distance of about 350 yards, with 3 to 6 feet water between. At a little more than 4 miles southward of Boa Viagem is Candeias point, the shore between forming a slight bay. At ¾ mile northward of Candeias point is that of Venda Grande, at about the same distance farther north is a slight projection named Focinho da boy.

From Candeias point the shore trends in a southerly direction 2 miles to Barra das Jangadas, thence for about 6½ miles to cape St. Agostinho, forming an indentation. At about 5 miles southward of Pernambuco lighthouse is a range of hills, on one of which at about 1½ miles inland, stands the church of Nossa Senhora dos Praseres, having two towers and being the highest object, forms a good distant mark for this part of the coast. To the southward is the village and chapel of Boa Viagem, which being on the point, is conspicuous; also the convent of Piedade, the village of Venda Grande, and the village and church of Nossa Senhora da Candeias, and at 3½ miles northward of cape St. Agostinho, the village and church of São Gonzalo da Paiva, near which are some rugged white cliffs which appear from a distance as white patches. From the cape northward nearly as far as Pernambuco the shore is low and covered with trees.

At 1¾ miles northward of Venda Grande point, and nearly abreast the convent of Piedade, is the north end of a narrow chain of rocks with about 2 feet water on them; they extend to the southward for more than a mile at about ½ mile from the shore. From Venda Grande point the reef turns to the southward, fronting the village of Candeias, and again terminates a little southward of Simão Pinto point north of Barra das Jangadas. The rocky bank extending to the southward from abreast the village of Afodados terminates about a mile southward of the Barra das Jangadas.

Candeias bar, at 9½ miles southward of Pernambuco lighthouse, is formed by a break in the reef 125 yards wide fronting the village of the same name. It lies NNE. of the church, and has a depth of 17 feet, mud, in the middle. Two rocky patches extending from the reef to the shore form the anchorage, but it is small and inconvenient.

Barra das Jangadas communicates with the two rivers Jaboatão and Pirapáma. It is about 42 yards wide, with 3 to 6 feet water; but as it is exposed to all winds there is a heavy sea, and the sands shift. Coasting vessels of light draft can cross the bar only under favorable circumstances. Inside the bar there is a space of more than ⅓ mile, with 2 and 3 fathoms water between sandbanks.

The rio Jaboatão is about 300 yards wide at its mouth, with 2 to 2¾ fathoms water. It trends to the NW. and its muddy banks narrow gradually.

The rio Pirapáma is 140 yards wide at its mouth, with more than 2 fathoms water; its stream runs with some strength and forms a waterfall at a little distance from its mouth.

Gaibú bay.—At 2 miles NW. of cape St. Agostinho is Pedras Pretas point, the space between is named Gaibú bay, where there is a depth of from 2 to 3 fathoms over mud and sand. The head of the bay is skirted by a chain of rocks close to the shore. Pedras Pretas point is also surrounded by rocks, and two isolated banks lie off it; the outer, with 14 feet at one mile from the point, bears from cape St. Agostinho N. 6° E. (N. 20° E. mag.); the other shoal is between the outer one and the point. In the bay at the foot of the cape is the little village of Gaibú, and about a mile from the cape is fort St. François Xavier de Gaibú, and in front of it the anchorage.

The bay affords shelter for small vessels from southeasterly winds, but the anchorage is limited and exposed to northerly winds, when communication with the shore is difficult.

Cape St. Agostinho is a rugged projecting promontory of moderate height. The cape is known by its red cliffs with a church and several cocoanut trees on its summit. Its base is formed by several points in detached large rocks, near which there are 5 and 6 fathoms water. In clear weather it can be seen at a distance of about 24 miles. At the point of the cape is a rill of warm fresh water, named the Rill of the Ladies; and the inhabitants of the village of Nazareth, on the summit of the cape, state that it never fails.

On the south side of the cape is fort Nazareth, and outside it a beach of sand named Salvação. At from 2 to 4 miles off shore there are from 11 to 15 fathoms water, sand and broken pearl shell.

Light.—On cape St. Agostinho stands an iron lighthouse, painted white, from which is exhibited, at an elevation of 345 feet above the sea, a fixed white light, visible in clear weather from a distance of 25 miles.

Coast.—From cape St. Agostinho the coast to the southward for 14 miles to Serramby point is low, level, and covered with brushwood.

At 6½ miles southward of the cape lies Cupe point, a little salient, with a village, and cocoanut trees on either side of it. The point is surrounded by a reef. At 3 miles southward of Cupe point is Porto de Galinhas; at about the same distance farther south is Maracahype point, and at 1½ miles SSW. of the latter is that of Serramby.

Between Cupe and Serramby points the coast is very low, and appears marshy. From the offing are seen quantities of cocoanut trees, the church of N. S. dos Oiteiros on a hill between Cupe and Maracahype points, and, in approaching the small villages of Cupe and Porto de Galinhas, another church near the sea at the mouth of the Maracahype. The shore is a white sandy beach.

The reef, which commences close to the coast forming the south part of cape St. Agostinho, is uncovered, and trends along shore, at a distance of 200 to 400 yards, to 1¼ miles southward of Camboa point, where it joins the coast. It appears close in front of Cupe point, and extends along by Porto de Galinhas and by Maracahype and Serramby points, terminating about ¾ mile southward of the latter and about one mile northward of Santo Aleixo island. The latter part is broken in places for distances of about ½ to ¾ mile, and NE. of Maracahype point it is nearly 1½ miles from the shore.

From about one mile north of Cupe point to Maracahype point the shore should be approached with caution, and not into less than 7 fathoms water, as shoal and irregular ground extends off from 1½ to 2 miles.

Rio Suápe.—This river flows into the sea at about 1½ miles SW. of cape St. Agostinho. It is 645 yards wide at its mouth, with 11 to 17 feet water over fine sand. At 2 miles up it is 215 yards wide, with 3 to 5 feet water, when it suddenly narrows. The bar of Suápe, which leads also to the rivers Tatuóca, Ipojúca, and Merépe, is formed by a break in the reef close southward of cape St. Agostinho. It is narrow, the ebb tide is very strong, and when the wind is from seaward there is a heavy sea.

It is difficult and dangerous to pass, frequented only by small vessels, which enter at high water and leave a little before that time. During winter, with south and SE. winds, vessels are sometimes detained for more than a month for a favorable moment to leave.

Rio Tatuóca flows into the sea southward of the Suápe, having with it a common entrance about ½ mile in breadth, bordered on either side by sandbanks. At 3 miles up it divides into two little rivulets; the Braza, running to the west, and the Taveira to the NNW.

Rio Ipojúca runs into the sea, through sandbanks which dry in places, at 3 miles southward of the cape, in the little bay formed by Camboa point on the south. It has from 5 to 7 feet water at its mouth, increases to 3 fathoms within, and deepens again for more than 3 miles up. It leads to the village of Ipojúca at about 7 miles from its entrance.

Rio Merépe runs into the sea close to the southward of the Ipojúca, within Camboa point. The entrance is encumbered by coral, which is also found in the river, where there is a depth of from 7 to 10 feet along the eastern bank. At 2¼ miles up is the port of Jaiqui, which is ¾ mile from the village, and is frequented by vessels by light draft for wood.

Porto de Galinhas.—The entrance to this port is formed between the northern extremity of the offlying reef bordering this part of the coast, and a rocky, isolated bank to the northward. In the middle of the entrance there is a depth of 3½ fathoms, and farther in 2¾ and 2½ fathoms, mud bottom, but near the shore coarse sand. A chain of rocks extend from the south point of entrance, which become scattered and encumber the port. The anchorage is exposed, being open to the bar, but small vessels whose draft will admit may anchor in front of the town by passing over the rocks at high water.

Vessels approaching Galinhas bar, when at a distance of 3 miles from the coast, should keep the two round mountains, which are behind Galinhas village, and distinctly seen, open northward of the cocoanut trees north of the village on Galinhas point, and steer in with the point bearing S. 50° W. (S. 64° W. mag.) for the bar, at about ¾ mile northward of the point. With the wind from north to east, a vessel can enter the port round the north end of the rocky bank, between it and Cape; but with southerly winds the passage first named should be taken.

Rio Maracahype runs into the sea from the northward, between the point of the same name and that of Serramby; it has 10 feet water at its mouth, and 7 to 14 feet in the river.

Rio Serinhæm flows into the sea southward of Serramby point. Its mouth is obstructed by sandbanks, leaving a channel navigable for small vessels, which load with wood about 6 miles in the interior. The Trapixe has a common entrance with the Serinhæm. It carries from about 6 to 9 feet water, and is navigable as far as the mill of the same name.

The reef from Serramby point to about 1½ miles SW. of Santo Aleixo skirts the coast at the distance of ½ mile, and covers the mouth of the river; it is bordered by a bank with isolated rocks; inside the reef there are a number of dry sandbanks and isolated rocks.

This part of the coast may be recognized by Santo Aleixo island, situated off the mouth of the river, and Sellada mountain at about 16 miles NW. of the island. Near the mouth of rio Formóso, 5 miles to the southward, on the summit of a hill, is the church of N. S. de Guadalupe, and more to the north in the interior, on the summit of another hill, is the town of Serinhæm and convent of San Francisco; also the villages of Barra de Serinhæm, Gamélla Sta. Anna, and Barra de Rio Formóso are seen from a certain distance, at the mouths of the rivers.

Serra Sellada, or Saddle hill, about 13 miles inland, is a ridge of high land extending north and south, with a break in the middle dividing it into two round hummocks. This is the highest land in the neighborhood.

Santo Aleixo island.—To the southward and westward of Maracahype point is the island of Santo Aleixo; it is 70 feet high at its SW. end. There are two houses and a well of fresh water; a few sheep and poultry are reared on the island. From the NW. part of Santo Aleixo a reef extends westward; at the south end, and connected by a reef, is Turtle rock; the reef continues about 200 yards southwestward of the rock.

About ¾ mile inside the island is a passage through the reef for country boats, to the mouth of the Serinhæm, but the sea breaks across it.

Tides.—It is high water full and change at the island at about 4h. 20m.; the rise of tide is from .0 to 12 feet.

Anchorage will be found inside the island in depths of 4 and 5 fathoms, sand and fine gravel. In going in southward of the island steer with the tallest cocoanut tree in the village, bearing N. 37° W. (N. 23° W. mag.); but as the dark background makes it sometimes difficult to distinguish, give the Turtle rock a berth of ½ mile; keep the lead going, and when in 6 or 7 fathoms haul to the northward and anchor where convenient.

Rio Formóso.—This river flows into the sea at 5 miles SW. from Santo Aleixo island, and 4 miles northward of Tamandaré fort; it is 456 yards across at its mouth, but widens a little within for about a mile, when it narrows, and after passing the town of Formóso there is hardly room for a boat. Within the entrance on the south side is a sandbank, leaving between it and the north shore a passage into the river carrying 8 feet water, which increases farther on to 17 feet.

The town of Formóso stands on the right bank about 5 miles from the entrance. Passo rivulet runs into the Formóso from the northward at 1½ miles within its mouth, and the Ariquinda from the southward at one mile. A remarkable building stands on the north point of entrance, and there are two white cliffs to the southward.

Gamélla bar, the principal entrance to rio Formóso, is 1¼ miles northward of the mouth of the river; from 85 to 110 yards in breadth, with 2 fathoms water, on muddy bottom. It is formed by a break in the barrier reef, which stretches close along shore, covering the mouth of the river from the south point of entrance to the northward of the village of Gamélla. Outside the bar the water deepens to 5 and 6 fathoms, over mud and fine sand, where vessels of more than 5 feet draft should anchor.

At Gamélla point, on a hill in front of the village, are some black rocks which are conspicuous from the offing, in contrast with the white sand.

From Manguinho, the south point of the entrance to rio Formóso, to Tamandaré, the coast is low and void of trees. The shore immediately south of the point makes a slight bend and forms Campas bay. The reef, which is uncovered at the little bar of Bobo, northward of Tamandaré, becomes covered in places and broken into detached rocks until the mouth of the Formóso bears N. 80° W. (N. 66° W. mag.), when it rises rapidly and shows three heads, named Juia or Criminóso, to the north of which it is again covered, terminating with the village of Gamélla bearing about S. 73° W. (S. 87° W. mag.), distant 2 miles.

The reef is skirted by sunken rocks. The space which separates it from the shore is also full of rocks, being a continuation of those in the north part of Tamandaré bay. This part of the coast is but little sheltered, and completely deserted. As the reef is often covered, the sea beats on the shingle shore with violence.

Directions.—Gamélla bar is known by the village and cocoanut trees on the point. In coming from the northward, having passed Santo Aleixo island, steer in the direction of Gamélla point, taking care to avoid the reef extending southward across the mouth of the Serinhaem. When the church of N. S. de Guadalupe (on the hill of the same name) is in line with the cocoanut trees on Gamélla point, then steer S. 40° W. (S. 54° W. mag.) for the bar, leaving the north end of the barrier reef, which is more than 2 miles from the shore to the eastward.

In coming from the southward, steer with Santo Aleixo island, bearing about N. 12° W. (N. 2° E. mag.) until the above church is on with the cocoanut trees; then proceed as before. The anchorage inside the bar is very limited, fit only for the smallest coasters, and is on muddy bottom in front of the village.

Tamandaré.—The port of Tamandaré, sufficiently large for several vessels, is formed by a bay fronted by the reef. The entrance is through a break in the reef about 800 yards in breadth, but is contracted by two reefs named the Baixa Grande and the Baixa Pequena. On the northern reef there is a depth of 14 feet; and on the southern, 10 feet.

In the middle of the entrance, south of Baixa Grande which is the wider channel, there is a depth of 6 fathoms, mud bottom, and north of that shoal 5 and 6 fathoms. Baixa Grande, nearly in mid-channel, has a depth of 13 feet and 4 to 6 fathoms around it. The Baixa Pequena is about 20 yards in extent east and west, with 10 feet on it, and lies NW. of Baixa Grande.

Anchorage.—The anchorage has from 3½ to 4 fathoms water close to the shore, and is protected by the reef, here named Ilha da Barra, but a vessel should not go far to the north on account of a chain of rocks which extends from Ilha da Barra to Tamandaré. There is, however, in the south part of the port a large space with good anchorage, but, as the exterior reef is low and covered at half tide, it is exposed to all winds.

In the bay, at rather less than a mile northward of Ilhetas point, is the entrance of the two little rivers Brejo and Ilhetas, but it is completely obstructed, and at low tides fronted by a bank. The village of Tamandaré stands on the sandy shore south of the point of the same name, and southward of it is a square fort. The port is capable of being improved, and from the fertile surrounding plains it may in the future acquire importance. It is the only place capable of affording any shelter from Pernambuco to Maceio.

Water can be procured from a well at the back of the fort. The casks have to be rolled some distance over soft sand, and not more than 15 tons can be obtained in a day. There is no trade here, it being merely a stopping place for coasters.

Directions.—The entrance to Tamandaré will be known by the village and the square fort south of it and some red cliffy land in the interior, also by an oblong hill named mount Brito with some cocoanut trees on the summit and an isolated house, and the same on the north extremity of the hill. Having seen the fort, steer for it until 3 miles from the shore, when the red cliff will be seen.

Bring the cliff in line with the cocoanut trees on the north extremity of mount Brito, and steer to the NW. for the bar, passing between Baixa Grande and the southern reef, and continuing the same route toward the fort until Ilha da Barra is passed; then steer to the north and anchor where convenient. Southeastward of the fort there is also anchorage, but the entrance is wide and exposed to the sea, which renders it uneasy.

Coast.—The coast from Ilhetas or Mamueabinha point trends to the southward and westward for 6 miles to Gravatá point, forming between an indentation, in the southern part of which the rio Una runs into the sea; beyond the latter point 3 miles is that of San José; the shore between is low, with the exception of a large and elevated rock named Pedra do Condé, which is isolated and remarkable, and here the hills come close to the shore. At about 1¼ miles northward of Pedra do Condé is a cluster of small rocks close to the shore named Pedra do Porto.

The village of Abreu de Una, on the west bank of the river, is remarkable from the offing. The reef, which is covered in places, passes at less than a mile from Ilhetas point, where, SE. of Pedra do Condé, it leaves a large open space named the Caixaô de Una. The village of San José has a hermitage on the point of the same name. From this latter point to that of Antunes at 8 miles further on the coast is uniform, but northward of Mangues point the land rises a little. The reef rises again at 1¼ miles from the shore and trends southward, broken in places, as far as Barra Grande. It is bordered by a rocky bank at the distance of ½ mile.

Caixaô de Una is formed by an open space in the barrier reef of about 1½ miles in breadth, and leads to an anchorage on the north having 2 fathoms water. From Gravatá point an inner reef in detached rocks extends northward across the mouth of the Una for nearly 2 miles; the reef is broken in two parts, leaving a passage for small vessels to the Una river. There is also anchorage in 2 fathoms on muddy bottom inside the northern portion of the inner reef named Caixaô, but it should be approached with a fair wind and a vessel should not go too far in, as there are sandbanks, and the current from the Una is very strong.

Directions.—The land northward of the Una is uniform, but it has a break at the village of Vaú, which is seen when abreast it. At the same time a small cliff is seen, which should be brought in line with Pedra do Condé; then steer for the anchorage, passing the northern reef which always shows at a prudent distance. In coming from the southward the constant line of breakers will be seen, and a vessel should be guided by the Pedra do Condé as before, but it should not be mistaken for that of Pedra do Porto, at about 1¼ miles northward of it.

Rio Una enters the sea at 6 miles southward of Tamandaré fort; it is about 16 yards wide at its mouth, with 7 feet water, and is obstructed by a bank having only 4 feet on it and on which the sea breaks in fresh breezes. Within, the river forms a pool on the south where is situated the village of Abreu de Una, and trends to the NW., leading to the villages of Varzea and Vaú Una, also to the town of Barreiros where a quantity of sugar is shipped. The current of the Una is rapid, and small vessels which frequent it are only able to descend when the water is high. In the summer the stream is less strong than in the winter, at which season it is dangerous.

Rio Cruz empties itself into the sea about ½ mile southward of Gravatá point, south of the Una; it is about 50 yards wide at its mouth, with 4 to 6 feet water, and leads to Campina Grande, a distance of 39 miles.

Rio Persinunga, about 12 miles in length, empties into the sea 3 miles southward of San José point, and separates the provinces of Pernambuco and Maceió. It is not navigable; on its south point are three or four huts.

Barra Grande, at 7 miles southward of the rio Persinunga, is easily known by the different white cliffs NE. of the church or convent of São Bento (which is by the side of a large house on the summit of a hill of the same name) and which extends northward to the church of Barra Grande, standing on a rising land near the shore, as well as by the village of Gamélla, southward of Barra Grande, situated between the hills.

The port of Barra Grande is in a bay about 2¼ miles deep, between São Bento point on the south and Antunes point on the north, a distance of 7 miles; but the part known as the port of Barra Grande covers only a space of about 2½ miles in length and 1¾ miles in breadth.

The bay is fronted and formed by the barrier reef which extends along the coast from the northward, passing 1½ miles from Antunes point, thence southward, trending about SW., with several openings, and continuing generally covered, in large detached rocks, named Alagados de Japaratuba.

The most important of these openings is the Barra Grande, which lies east of Gamélla; at 1,300 yards to the north is a second opening named Barreta de Cauindé, and at the same distance on the south is a third opening named Alagados. The entrance to Barra Grande is about 150 yards wide. At the entrance there is a depth of 3¾ fathoms, and from 2 to 3¾ fathoms inside the reef. A patch of 2¾ fathoms lies 800 yards SE. of the entrance. On approaching the bar bring a conical green hill midway between two cliffs and steer about N. 59° W. (N 45° W mag.) over the bar.

When inside the bar a vessel may anchor off the town of Barra Grande, but not too far to the northward, in order to avoid the sand-bank which stretches from the shore to the reef, or southward of the town of Gamélla. An inner reef commences near the town of Gamélla, curving seaward at a distance of one mile and extending as far south as Porto de Pedras, where it again unites with the shore; it is broken in places and has from one to 2 fathoms inside it.

Rio Salgado runs into the sea a little southward of the church of São Bento. It is 18 miles in length, 25 yards wide at its mouth, with about 4 feet water. Northward of it are the small rivers Maragogy and Páus, which are 6 and 12 miles in length, but of no importance.

Serras of Marambaya.—Westward of Barra Grande, and about 25 miles inland, are the serras of Marambaya, a conspicuous chain of mountains, which may be seen at the distance of 45 miles. The surrounding land has no diversity of appearance.

Porto de Pedras, 9 miles southward of Barra Grande, is protected by the barrier reef, having during southerly winds smooth water inside it, with 3 and 4 fathoms water, sandy bottom. The port is capable of admitting 5 or 6 vessels of about 120 tons. Strangers should approach cautiously with the lead. At about ¾ mile northward of the end of the reef which shelters the anchorage is Baixa Grande, and nearly the same distance north and NW. of it two other shoals. Rio Porto Calvo enters the sea southward of the anchorage. The town on the shore south of the entrance carries on a small trade.

Coast.—From Porto de Pedras to the rio Camaragibe, 13 miles to to the SW., the land is level, dotted with low brushwood and cocoanut trees, and having a white, sandy beach, bordered by the barrier reef, which is about a mile from the shore. On the south side of the Camaragibe is a range of bare cliffs of red sand. Near the river Sto. Antonio-mirim, or Little Sto. Antonio, at 17 miles farther south, is also a range of red cliffs 1½ miles in extent, and three small round hills which stand on its northern side; between the two rivers is that of

Sto. Antonio Grande, several small streams, and one or two little villages.

The shore also along this latter part of the coast is bordered by the reef, which is broken and uncovered in places, and extends from one to 1½ miles from the coast, terminating a little SW. of the Sto. Antonio-mirim. From thence the coast continues to the SW. for 7 miles to Verde point. Between, several small streams run into the sea, and the rocks here and there extend off about ¾ mile.

Anchorage.—There is anchorage, with northerly winds, protected by the shoals and reef southward of the entrance to rio Camaragibe, in from 2½ to 4 fathoms water, muddy bottom.

Verde point, the northeastern point of Maceió bay, has many cocoanut trees on it, is low, salient, and surrounded by rocks and heavy breakers. The coast northward of it is generally sandy, with small portions of reddish cliffs, and partly covered with cocoanut trees.

Maceió is the only convenient anchorage between Pernambuco and Bahia, and protected from all northerly winds and as far south as ESE. by the reef, which terminates suddenly at 2 miles southwestward of Verde point and is covered at high water. A buoy is moored near the extremity of the reef. The shore of the bay is a white sandy beach, along which, interspersed with cocoanut trees, is the village of Jurugua, and about ½ mile eastward, in an outer bay, is the village of Paijucara, with a sandy point between, on which stands the captain of the port's office. A soap factory, with a tall, conspicuous chimney, is erected on the point and shows well from the eastward.

In the summer months this bay may be considered safe, but from May to September, when the southerly winds prevail, it is much exposed and a heavy swell sets in. With southerly winds, the landing is bad at low water, the steps at the trapiche, or covered wharf, being the only place to land.

Close to the westward of Jurugua is a rivulet, with a small fort; and on the hill above, on the western side of a wooded bluff, is the town of Maceió, the capital of the Alagoas, with a population of 14,000.

The principal exports are cotton, hides, sugar, and rum.

The United States is represented by a consular agent.

Railway.—There is a railway from Maceió to Imperatriz; length open (1888), 55 miles.

Supplies.—All kinds of supplies are to be had, but they are very dear. Water can be obtained by digging wells, or in the bay of Paijucara, at a well near the beach. Plenty of fish may be obtained near the reefs and in the lagoon.

Shoals.—About 1½ miles southward of office of the captain of port, or about 800 yards from the southern extremity of the reef, is Baixo, a detached shoal, with 15 feet water, and on which the sea breaks with strong southerly winds.

The shoal lying about 450 yards westward of Baixo shoal has a depth of 2½ fathoms on it at low water spring tides.

Another shoal lies NW. of Baixo shoal, and nearly midway between the shoal above mentioned and the buoy at the SW. extreme of the barrier reef. This shoal, of small extent and composed of coral, has 2½ fathoms on it at low water spring tides, with 7 to 8 fathoms close around; it lies with the NW. extreme of Baixo shoal bearing S. 56° E. (S. 42° E. mag), distant 700 yards.

Light.—On the southwestern point of the hill on the east side of the town of Maceió stands a lighthouse, which exhibits, at the height of 208 feet above the level of the sea, a light which should be seen in clear weather from a distance of 20 miles. The light is fixed and flashing. It shows a steady white light for 70 seconds, it is then eclipsed for 16 seconds, then a white light for 12 seconds, another eclipse for 22 seconds, then again the steady light, thus completing its phases in an interval of two minutes.

Pilots.—The harbor master at the village of Jurugua will come off to vessels on the usual signals for a pilot being made; but the men who fish in the jangadas, or sailing rafts, which are constantly met with on this coast, are good pilots.

Tides.—It is high water, full and change, in Maceió bay, at 4h. 30m.; springs rise 8½ feet.

Directions.—From March to September vessels should approach the bay from the southward on account of the current. The land may be known by mount Barriga standing alone in the interior, by a reddish spot on the face of the cliff about 5 miles SW. of Maceió, and by a white chapel, with two towers, in the same direction. The president's palace, a large square white building, the house of assembly, new church, and lighthouse at Maceió can also be seen from a long distance. There is nothing on the coast to indicate the position of Maceió to vessels coming from the northward, but in closing with the bay Verde point, being salient and surrounded by breakers, can not be mistaken, to which give a berth, and in rounding the reefs Maceió will be seen. The passage southward of the Baixo is recommended. In coming from the southward keep the light bearing about north (N. 14° E. mag.), which will lead nearly up to the anchorage; then steer in according to discretion. Anchor where convenient to the NW. of the reef in about 4½ fathoms, sand and clay, clear bottom. The passage northward of Baixo is reported unsafe and should not be used.

Lagoa (Lagoon) do Norte is about 4 miles in length in a NW. direction, and 2½ miles in breadth, having from 3 to 8 feet water, muddy bottom. The rio Mundahu runs into its inner or NW. part. Many houses are scattered along its NE. and two villages with their chapels on its SW. bank. Its narrow entrance is 2¾ miles SW. of Maceió lighthouse, and the passage in, with a depth of about 4 feet, is between low islets and shoals for 2 miles.

Lagoa Manguaba, at about 4 miles westward of and parallel to lagoa do Norte, runs into the interior for nearly 19 miles. At 3½ miles from the sea it gradually widens till it attains a width of 3 miles at its head, with depths of 4 to 14 feet, muddy bottom. Several small streams empty themselves into it and two or three villages stand on its banks. The entrance to this lagoon is in common with that of the lagoa do Norte, and runs to southwestward inside a narrow tongue for 3 miles, when it trends to the westward a little northward of port Francez.

From the SW. part of the lagoa do Norte a narrow stream winds to the SW. into that leading to the lagoa Manguaba and forming with it Sta. Rita island. The town of Alagoas stands at the south end of the lagoon at 3½ miles from the coast. The produce of the interior is brought to the coast through the lagoons by means of boats.

Rio de San Miguel.—At 8 miles SW. of Verde point is port Francez, which is small and can be used only by small coasters. About 6 miles farther to the SW. is the bar of rio de San Miguel. The town of Santa Anna stands on the northern point of entrance, and here the produce of the surrounding country is shipped in small coasters. From a little distance seaward the roads about Santa Anna may be seen.

Anchorage.—At one mile off the south point of entrance to rio de San Miguel are some sunken rocks which extend southwestward for 2 miles; the north rocks are occasionally uncovered. Inside them there is anchorage in fine weather in 2 and 2½ fathoms, sand and mud.

Lagoa de Jiquiá.—The shore from the San Miguel runs to the SW. for 15 miles to the bar of lagoa de Jiquiá; midway is Azeda point, with a few cocoanut trees. It projects a little, and shoals extends off for 1¼ miles, with 7 fathoms water close to them. The lagoa de Jiquiá extends northwestward for a distance of 11 miles, where the river of the same name falls into it. This lagoon is 1¾ miles wide, with 6 feet water in the entrance channel and from 6 to 17 feet water inside. It is navigable at high water springs for craft of about 80 tons. Coasters anchor outside the bar.

Coast.—The coast in the vicinity of lagoa de Jiquiá is about 80 feet high, nearly level, tolerably wooded, with several reddish cliffs, and a sandy shore. Immediately within the land is formed into several lakes or lagoons which have a small outlet to the sea.

From the entrance to the lagoa de Jiquiá the coast continues to the SW. for 10 miles to the mouth of rio Coruripe, and 25 miles farther to the SW. is the bar of rio San Francisco. It is low, sandy, and as far as 9 miles to the SW. of Coruripe point are several outlying dangers, hereafter described.

Coruripe point projects seaward, forming a bay open to the southward nearly a mile deep, incumbered by rocks, and where the river of the same name runs into the sea. The village and several cocoanut trees stand on the point. Here the barrier reef rises and extends for 5 miles along the coast at the distance of 2¼ miles, broken and uncovered in places.

Inside the central part of the reef there are numerous sunken rocks.

There is, however, anchorage in 2½ fathoms water, between the rocks and those in the bay. The passage is between the north end of the barrier reef and Coruripe point. There is also anchorage, with southerly wind, in 2¾ fathoms water on the north side Péba point, protected by the reefs. The latter point has two or three houses and some cocoanut trees on it.

Shoals.—Dom Rodrigo rocks, situated about 3 miles in a S. 45° E. (S. 32° E. mag.) direction from Coruripe point, are uncovered at low water. These rocks are upward of a mile from the reef fronting the mouth of the Coruripe river, with 5½ and 6 fathoms water between them and the reef.

Lages de Miahy is more than a mile in length, with a least depth of 3¼ fathoms, and lies 3½ miles S. 40° W. (S. 53° W. mag.) of Dom Rodrigo rocks, with Coruripe point bearing N. 9° E. (N. 22° E. mag.), distant 5 miles and 1½ miles from the barrier reef.

Baixos de Japú, situated 3 miles SW. of Lages de Miahy, is 1¼ miles in length NE. and SW., with a least depth of 1¼ fathoms. It lies 4¼ miles from the shore, with the little hill of Japú, known by two cocoanut trees, bearing N. 39° W. (N. 26° W. mag.), and Moita das Oncas, a hill northward of Péba point N. 88° W. (N. 75° W. mag.). These dangers have 7 and 8 fathoms close to them. Patches of 4¾ and 5½ fathoms, whose positions are doubtful, lie, respectively, 5½ miles N. 85° E. (S. 82° E. mag.) and 4¼ miles S. 67° E. (S. 54° E. mag.) off Péba point. It is not prudent to approach the coast nearer than 13 fathoms.

Rio San Francisco do Norte has its source near Ouro-Preto, a city situated 150 miles northward of Rio de Janeiro. Its course, which is estimated at 1,600 miles, has a general NNE. direction as far as the parallel of 9° S.; thence it runs in an ESE. direction to the sea.

Numerous rapids and cataracts, as well as a shallow bar, prevent this river being very useful to outside commerce. The rapids of Paulo Affonço, 60 miles long and 190 miles from the bar, effectually stop any continuous communication between the sea and the country beyond. The river loses its depth and rapidity as it advances through the flat country towards the sea, the banks being subject to great inundations between March and September, when the stream is very strong.

It empties itself into the sea at 24 miles SW. of Coruripe point. The surrounding country near the mouth is well populated and produces sugar cane, cotton, wood, and tobacco in abundance.

Within the bar the river deepens to about 5 fathoms, thence to Ilha dos Bois and Muffins point the depth increases to about 11 feet, and nearer Penedo to 8 feet; abreast Penedo there is 5½ fathoms. The tide is not felt above this. It is stated that in December and January the river frequently rises from 6 to 8 feet above the ordinary level, at which times there is more water on the bar. Leaving the river is difficult in a sailing vessel on account of the prevailing wind, but tugs, which also carry on the river traffic, are available at a cost, irrespective of the size of vessel, of about $250.

Penedo.—The principal town in the neighborhood of the coast is Penedo, on the left bank of the river, about 24 miles from the bar. The north point of entrance and the coast northward of it are of low quicksand without vegetation. Manguinha, the south point of entrance, is low, flat, covered with mangroves, and projects to the SE.

Bar.—Heavy breakers extend seaward from both points of entrance for a distance of 1½ miles, between which, in a direction E. by S. from the lighthouse, is the bar, with a depth of about 9 feet at low water. In SE. winds there is a heavy sea on the bar.

Pilots.—The maximum draft for vessels entering the river is considered to be 12½ feet. The services of a pilot are necessary, who will signal the draft of the vessels to the signal station before proceeding.

Anchorage.—The ordinary anchorage outside is to the southward of the bar in about 7 fathoms, but it is an uncomfortable one; that to the northward, under shelter of the banks, is to be preferred.

There is anchorage in the river, off the village on the north bank, about ½ mile within the entrance points.

Light.—From an iron, octagonal tower, painted white, on Samôco point, SW. side of entrance to the river, is exhibited, at an elevation of 59 feet above the sea, a fixed white light, which should be visible in clear weather from a distance of 10 miles.

Coast.—The coast from the entrance of rio San Francisco is low and trends in a SW. direction for about 49 miles to the bar of the rio Cotinguiba. At 6 miles from the mouth of the San Francisco is a small offshoot from that river named Barra Nova, which discharges water during the rainy season; at 25 miles farther to the SW. is Japaratuba rivulet; and about 18 miles farther on is the mouth of the Cotinguiba. The shore between, a low and uniform plateau, is backed by the serra de Pacatuba; and farther in the interior, to the west and SW. are the serras de Coralinho and Itabaianna, which are seen only in clear weather.

To the NW. of Cotinguiba bar is mount Aracaju, remarkable from a cut or notch at its northern extremity, and a church with two towers on its south side; W. by N. of it will be seen the Cardinals hat (so named from its similarity in shape), the southern peak of the Itabaianna range. Vessels should not approach this part of the coast very near, as with strong southeasterly winds it would be difficult to gain an offing. The beach is flat and the bottom hard sand.

Rio Cotinguiba (Port Aracaju) is much frequented. The bar has about 14 feet on it at high water springs, but owing to the constant swell it is not safe for vessels drawing more than 11 feet.

The *Arken* came out drawing 11 feet 3 inches in January, 1892, with all conditions favorable, but struck on the bar.

The town of Maroim is situated about 8 miles up the river from Aracaju, and can only be approached by boats or small craft drawing not more than 2 feet of water.

The approach to the river may be known by the morro de Telha, by mount Aracaju, and also by the lighthouse at its entrance. At 3 or 4 miles off shore there is a depth of 5 or 6 fathoms.

As vessels can not get under weigh from the anchorage in the river before the ebb tide begins, and as much time may be lost before reaching the bar, they ought not to draw more than 11 feet; and vessels of this draft are often considerably delayed. There is a steam tug here of 150 tons register, the charge for towing in being 500 reis per ton and out 100 reis per ton; 100 tons register is equal to 128 tons Brazilian.

Light.—On the south side of the entrance to Cotinguiba river stands a conical white tower, from which, at an elevation of 125 feet, is exhibited a *fixed and flashing* white light. Reported to show fixed for *thirty seconds*, followed by *five flashes* of *two seconds* each, separated by eclipses of *three seconds* (1892), visible in clear weather from a distance of 17 miles.

Buoy.—A large iron buoy, painted red, is placed off the bar in 9 fathoms to prevent this river entrance being mistaken for Vazabarris river, 14 miles to the southward, where there is a similar signal tower, with the exception that the flagstaff has no cross-arms (not existing 1882).

Directions.—Signals for the guidance of vessels crossing the bar are made from the summit of the lighthouse.

(1) A white flag at the masthead denotes vessel seen from the shore.

(2) The white flag on the flagstaff, and a black ball hoisted on a runner between the two angular poles north and south of the tower, is only hoisted when there is sufficient water on the bar and the tide favorable for entering.

This black ball is moved to the north or south pole according to the direction the vessel should steer; when the ball is directly under the white flag the vessel is steering correctly, and the signals will remain flying to guide the vessel until she has passed the tower.

(3) If the white flag is hoisted and lowered again, it implies that the vessel should stand off and wait for the tide.

(4) Any other signals that may be hoisted do not refer to vessels outside the bar.

If the master of a vessel has never been in the Cotinguiba, he should not enter without a pilot, or avail himself of the signals, unless in case of absolute necessity. The pilot boat is smack rigged, and will come out with the first of the ebb.* There is good anchorage northward of the bar in 6 or 7 fathoms water, fine hard sand, and for small vessels in 4 fathoms, over mud and fine sand. Vessels should, if possible, always remain under way and if too late for the pilot to come off that night they should make the signal and stand to sea, keeping well to the northward or southward according to the prevailing current, and be in a position to meet the pilot in the morning.

---

* It is reported that pilots are scarcely ever to be obtained for vessels entering the river.

The shipping season is from November to April, at which period the land should be made well to the northward of the river, as the current sets to the southward along the coast at the rate of from 1½ to 2 miles an hour.

Rio Vazabarris (Sergipe), situated about 14 miles SW. of the Cotinguiba, may be known from the southeastward by three small hills, of equal size, covered with brushwood, named Os Tres Irmãos (the three brothers), at about 9 miles to the SW.; also by the whiteness of the sandy south entrance point, on which there is a signal station, elevated about 40 feet, where signals are shown when a vessel is sighted. The river derives its name from the town of Sergipe, at the foot of these hills, on one of the branches of the river. At Vazabarris bar, the signals are nearly similar to those at Cotinguiba. The channel across the bar lies in a westerly direction, with 12 feet at mean low water and 23 feet at high spring tides.

During the northern monsoon the bar is always smooth and a vessel may load to 14 feet at mean high water.

After crossing the bar the river trends NW. about 2 miles, with 10 fathoms hard sand; thence W. by N. for 9 miles, with 9 to 5 fathoms mud; and then SW. by W. about 2 miles to the anchorage in 3 fathoms soft mud, off the wharf where sugar is shipped. It is here necessary to moor head and stern, as the river is very narrow.

The town of San Christavão can only be visited in a canoe, which the master must do to enter and clear his vessel.

When loaded, sailing vessels must tow out. A tug can be procured from Aracaju.

Buoy.—The spare telegraph cable belonging to the Western Brazilian Telegraph Company is marked by a buoy in latitude 11° 14′ S., longitude 36° 57′ W., abreast the rio Vazabarris.

Rio Real lies about 23 miles SW. of rio Vazabarris; the mouth of this river can not be seen from the sea, but will be known by the breakers seaward of it. Mangue Secca, the south point of entrance, extends from a beach of white sand, known to the coasters as the Prancha, or plank of Rio Real. The bar is said to carry 15 feet water at springs, but there is generally a heavy sea, and it should not be attempted without a pilot. In the vicinity of the bar there are a few houses, seen at a distance of 2 miles from seaward.

Light.—On the north side of the entrance of rio Real stands a quadrangular white tower, from which is exhibited, at an elevation of 70 feet above high water, a *fixed* white light, seen in clear weather from a distance of 10 miles.

Rio Itapicuru.—At about 19 miles SW, of the bar of rio Real is that of Itapicuru, obstructed by breakers, and said to carry 7 or 8 feet at high water. There is a village on the south point of entrance and another some distance within. With the river bearing about west, some downs will be seen over it a little higher than those to the right or left. Small coasters and jangadas enter this river.

Coast.—The coast from Cotinguiba bar trends southwestward for about 37 miles to the mouth of rio Real; from thence, more southerly to a little beyond the parallel of 12° S. At 6 or 7 miles from the bar of Itapicuru the Oiteros de San Miguel, a series of small hills, border the coast to the SW. From about the parallel of 12° S. the shore again trends to the SW. for 40 miles to the tower of Garcia de Avila, a sort of fort with a signal post, standing among trees on rising land, and the most remarkable object on this part of the coast. At about 11 miles northward of Garcia de Avila is mount Massarandupio.

From the tower of Garcia de Avila the coast continues to the SW. for 30 miles to Itapuan point, on which is a small village; and thence about WSW. for 18 miles to San Antonio point. It is composed of sandy downs, varied by small brushwood and cocoanut trees, with a white sandy shore, bordered by the reef, many parts of which are always above water, appearing detached from the coast like islets, particularly those about Itapuan point.

The shore may be approached to the distance of a mile in 11 to 14 fathoms mud, sand, and coral. The water deepens suddenly, and at 10 miles from the land, in places there is no bottom with 35 fathoms.

Light.—On Piraboca rock, 600 feet from the shore near Itapuan point, is a round iron lighthouse, painted red, which exhibits at an elevation of 68 feet above high water a *fixed* white light, visible from a distance of 12 miles.

San Antonio point, the SW. extreme of the land forming the eastern side of the entrance to Bahia, is of moderate height, covered with trees, and can be seen in clear weather from a distance of 30 miles. The land in the vicinity of the cape is higher than that to the westward. Fort San Antonio, with its lighthouse, stands on the extremity of the cape, and at 3 miles eastward of it there are three or four brown looking bluffs; eastward of which lies Itapuazinho point, another low brown bluff, with cocoanut trees.

When coming from the northward and eastward, San Antonio point will be shut in with the westernmost bluff, and when first seen at a distance appears a little separated from the mainland. Between this bluff and point are many houses. The landing on this part of the coast is difficult, and here the barrier reef terminates,

Light.—A light is exhibited from fort San Antonio at the height of 128 feet above high water, and in clear weather should be seen from a distance of 18 miles. The light is *flashing*, showing two *white* flashes and one *red* flash with an interval between each flash of *ten seconds*, Obscured by the land southward of N. 82° W. (N. 71° W. mag.).

San Antonio bank, an irregular-shaped shoal, composed of red sand and coral, is the principal danger in entering the anchorage of Bahia. It extends north and south 4 miles, and its greatest breadth is about one mile; the general depths over it are 4 and 5 fathoms, but on the north end of the bank, at about ¾ mile S. 20° E. (S. 9° E. mag.) of the lighthouse, there are patches of 2¾ and 3 fathoms, at ½ and ¾ mile southward of it. A depth of 3¼ fathoms will be found on the south end of the bank at 4½ miles S. 11° E. (south mag.) of the lighthouse; there is also a patch of 2¼ fathoms on the eastern edge, S. 23° E. (S. 12° E. mag.), nearly 3 miles from the lighthouse. The bank is steep-to, and in places with strong winds the sea breaks. From the depth of 5 fathoms at the south end, San Antonio point bears N. 8° W. (N. 3° E. mag.) distant 4¾ miles; and at one mile southward of it the depths are from 17 to 20 fathoms; nearly the same depths will be found one mile from its eastern side, decreasing to 6 fathoms close to the bank.

In fine weather and smooth water vessels of about 15 feet draft constantly pass over the bank, but it is dangerous with southerly winds and any sea. The north end is nearly a mile from the green rocky point next east of the cape, with a channel between carrying from 4½ to 9 fathoms.

Buoys.—San Antonio bank has been marked by four buoys in accordance with rules established by the International Maritime Conference at Washington. The north buoy is white; the east buoy white and red in vertical stripes; the south buoy is red, and the west buoy white and black, in vertical stripes. These buoys are not to be depended upon.

Rock.—A sunken rock, having 9 feet over it at low water, lies N. 64° W. (N. 53° W. mag.) from the lighthouse on San Antonio point, distant 500 yards, and is marked by a spherical buoy.

Winds.—During the northerly monsoon, between the parallel of 10° and 13° S., the winds have a daily variation. At night the land wind is seldom felt outside the reefs; but at the approach of day it freshens and unites with the trade wind, which inclines to the northward until noon; after that hour the wind veers again to the eastward, making an angle of about two points between that of the morning and that of the evening, which a vessel in working to the northward should take advantage of.

CHAPTER VII.

COAST OF BRAZIL.—BAHIA TO RIO DE JANEIRO.

Bahia, or San Salvador.—The entrance to Bahia de Todos os Santos, or bay of All Saints, 4¾ miles wide, is formed on the east by San Antonio point and on the west by Itaparica island. The bay extends to the northward for 25 miles, and its greatest breadth is about 20 miles, having sundry islands at its head, with several rivers running into it. As a place of call for vessels in want of repairs or supplies of any kind, Bahia is very convenient; it is healthy, and easy of ingress and egress without the aid of a pilot; nor does there appear any difficulty of vessels getting to the southward from this port, on account of the tendency of the winds from that direction from March to September, as they generally draw well to the eastward and more so when farther to the southward. The province of Bahia contains 39 towns, with an estimated population (1888) of 1,821,089.

Bahia, or San Salvador, the capital of the province, was founded by Thomas de Souza, 1549, and stands on elevated land on the eastern side of the entrance to the bay, about 2 miles north of San Antonio point. It is built on the ridge and declivity of the land facing the anchorage west of it, and consists of an upper and lower town. The Cidade Alta, which includes the suburbs of Bomfim and Victoria, contains several fine streets, where the principal merchants reside. The Praia or Cidade Baxa consists principally of one street of considerable length, and contains the magazines and warehouses for inland produce and foreign goods. Here there is a naval arsenal.

The public buildings are the cathedral, in the upper town, built of marble, and said to be the handsomest building of the kind in Brazil; several churches; the palaces of the archbishop and governor, an ancient college, now the military hospital and a medical school; the town hall; the tribunal of appeal; the theater; several hospitals; a bank; exchange, etc.

The town and shipping are defended by several forts. The first is that on San Antonio point; a little northward are Santa Maria and St. Diego; at the SW. extremity of the town is fort Gamboa, with that of San Pedro, and farther on the insulated circular fort San Marcello do Mar, protecting the navy yard. There are other smaller batteries along the beach and one on Mont Serrat point. On the land side the town is defended by forts and other fortifications. Numerous tramways intersect the town.

The commerce of Bahia consists chiefly of the exports of sugar, cotton, rum, tobacco, coffee, cocoa, hides, etc.; and the imports of manufactured articles, flour, salt, iron, glass, wines, etc.

The population of the town and suburbs is about 162,000.

The United States is represented by a consul and vice-consul.

Banks.—Baixo Grande.—The principal passage into Bahia is 2½ miles wide, between San Antonio bank on the east and Baixo Grande and other reefs, extending from 1½ to 2½ miles southeastward from Itaparica island, on the west. The water is generally deep; the fairway to the entrance has from 13 to 20 fathoms, and this latter depth will be found at nearly 2 miles westward of the town; from thence to Baixo Grande the depth is from 17 to 25 fathoms, decreasing suddenly on the banks to 1½ and 2½ fathoms, with overfalls. Westward of the banks the water deepens to 8 and 10 fathoms.

Gamboa bank, or Ciudad, skirts the shore in front of the town; a patch of 1½ fathoms on the outer edge, at the distance of 600 yards N. 42° W. (N. 31° W. mag.) of fort Gamboa, is marked by a red buoy in 2¼ fathoms at low water. Many vessels have grounded on this bank.

Panella bank.—Westward and northwestward of fort San Marcello do Mar a rocky bank, named Panella, with 3½ fathoms on its western edges, extends for nearly one mile. There is good anchorage, according to draft, all around it. At ½ mile N. 20° E. (N. 31° E. mag.) of fort do Mar is the sunken wreck of a large French vessel burnt in 1856, marked by a buoy. Between the wreck buoy and the French packet moorings northward of it is a bank about 600 yards in extent, with a depth of 2¾ fathoms.

Buoys.—Panella bank is marked by four buoys. The north buoy is black; the east buoy red and white in vertical stripes; the south buoy is red, and the west buoy black and white in vertical stripes. These buoys are not to be depended upon.

Anchorage.—The anchorage for vessels of war is off the public garden in 9 fathoms, muddy bottom, at about ¾ mile from the shore, with fort do Mar bearing about N. 68° E. (N. 79° E. mag.) and fort Mont Serrat N. 18° E. (N. 29° E. mag.) or, if convenient, a little nearer in. The Brazilian vessels of war anchor nearer the arsenal. Vessels moor in the direction of the tide, parallel to the coast, NNE. and SSW. Merchant vessels on first arrival generally anchor about one mile SW. of fort do Mar until visited by the proper officers, when the hatches are sealed, and a berth in the discharging ground is pointed out for them to remove to. The discharging ground is between two imaginary lines running S. 70° W. (S. 81° W. mag.) of fort do Mar and the consulate, and extending about a mile off shore. The loading ground is to the northward of these lines.

It is seldom that the prevailing winds during the day will not permit a vessel reaching the anchorage at Bahia without tacking, as the most common are those from the east and SE. In the southerly monsoon only, and principally in the months of July, August, and September, they sometimes veer to the SW. and cause much sea. particularly at the change of tide; but this does not last long and happens only at the time of new or full moon.

During the night the wind is weak, variable, and generally off the land. In the morning, during the fine season, it is from north to NE., and often fresh, which cools the atmosphere, and after an hour's calm is replaced about 10 or 11 o'clock by the wind from ESE. to SE. In the evening at sunset it falls light, and at 8 or 9 o'clock it blows in little gusts from the head of the bay until sunrise, when it veers to the north and NE., and freshens.

Supplies.—Vessels will find at Bahia the means of providing for all their wants, but, with the exception of fresh meat, vegetables, and fruit, the charges for everything are high, particularly for naval stores. Water may be obtained between the town and fort Gamboa under the public garden, at other places, and by tank vessels if arranged for. The market is about midway between the customhouse and consulate, near the water side, and well supplied with poultry, fish, fruit, vegetables, etc. Wood for fuel is abundant.

In the fine season vessels can refit and repair at the usual anchorage. Lighters built for the purpose, with every necessary for heaving vessels down, are moored inshore of the loading ground, and a vessel 2,400 tons has been hove down here.

Coal can be obtained in large quantities. About 8,000 tons are kept in stock. Vessels are coaled by lighters at the rate of 100 tons per day. Between April and August southerly gales prevail, which cause a sea in the anchorage.

Patent slip.—Northward of the town, in Itapagipe bay, there are merchant yards, and a patent slip, where vessels can be repaired at all times of the year.

Signals.—The signal B. N. W., Commercial Code, denoting "Where from," is made to vessels approaching Bahia by small flags hoisted at Fort Gamboa. Should this be not immediately answered a gun is fired to enforce attention, and repeated with very little delay if necessary.

NOTE.—As a fine of $10 is imposed for each gun fired, vessels are recommended to approach with a signal flying indicating last port of call.

Communication.—Several lines of railway connect Bahia with other parts of Brazil. Three lines of British steamers call here; also French, German, American, Spanish, and Brazilian steamers, 12 lines in all. Mooring buoys are set apart for them northeastward of fort do Mar.

Electric cables.—A submarine cable in connection with Europe is laid with Mont Serrat point just open of San Antonio point; and another leads northward and eastward of San Antonio bank.

Port charges.—Anchorage dues are 500 reis per ton for all vessels entering and clearing with cargo; entering with cargo and clearing with ballast, or *vice versa*, 250 reis per ton; hospital dues, 640 reis per man; clearance, 15 to 20 milreis; translating manifest, 10 to 30 milreis; bill of health, 3,200 reis; stamps, 10 milreis; custom guards, 10 to 20 milreis; light dues, 40 milreis for vessels of 200 tons; 60 milreis for those of 400 tons; 80 milreis for those of 700 tons and above 700 tons 100 milreis. Light dues are paid only at the first and second ports of entry along the Brazilian coast.

Lights.—A *flashing* light is exhibited from San Antonio point. A *fixed red* and *green* light is exhibited on fort Sta. Maria, ½ mile northward of San Antonio, visible about 5 miles; shows *green* from west (N. 79° W. mag.) through north to east (S. 79° E. mag.); red over rest of horizon. A fixed *red* light from fort S. Marcello do Mar, visible 4 miles.

A small *red* light is shown from near the customhouse. A *fixed* white light is shown from Mont Serrat point, at an elevation of 18 feet above high water and is visible 7 miles.

A fixed *red* light is shown from Nossa Senhora do Gaudalupe, south point of Frade island, and should be visible from a distance of 9 miles.

Tides.—It is high water, full and change, at Bahia, at 4h. 26m., and the spring rise is 8 feet. The flood runs 5 hours to the northward, and the ebb 7 hours to the southward. The velocity of the tide is about 1½ miles an hour, increasing to 2½ and 3 miles during springs.

Directions.—Vessels bound for Bahia from March to September should make the morro de São Paulo, and then steer to the northward. The dark land of San Salvador is strongly contrasted with that of Itaparica, the former having darker and denser foliage. Victoria church will be the first object seen on the land, and soon after the white lighthouse on San Antonio point will be seen on a dark background. Approach the lighthouse between the bearings of N. 12° E. (N. 23° E. mag.) and N. 34° E. (N. 45° E. mag.) and bring the convent of Bomfim, a conspicuous object situated on the top of a hill about ½ mile to the NE. of Mont Serrat point, just open of fort St. Maria, bearing N. 18° E. (N. 29° E. mag.), and steer for it, which will lead up to the man-of-war anchorage. Vessels proceeding northward of man-of-war anchorage should keep well to the westward of the buoys on Panella bank.

As the strong sea breezes force the waters into the bay northward of morro de São Paulo, a vessel sighting that light should not bring it to bear southward of S. 40° W. (S. 51° W. mag.), nor approach Itaparica island nearer than 11 to 12 fathoms water; westward of Bahia it will be safe to stand only about half way across.

From October to January the coast should be made about 10 miles northward of Itapuan point, where there is a large building like a factory close to the beach, and a lighthouse close to, on Piraboca rock. Or if from the northward, when on the parallel of 12° 30′ or 12° 40′, at about 20 to 25 miles from the land, a hill of moderate height will be seen above the horizon, and nearer the coast a series of white sandy downs interspersed with dark verdure. The sandhills to the NE. of

Itapuan point form a good mark for making the land to the northward of Bahia; they are of white sand interspersed with dark patches of brushwood, and on a clear night may be seen from some distance. Continuing along the coast at the distance of 3 or 4 miles, a vessel will pass several other downs and Itapuazinho point, remarkable by the cocoanut trees on it.

Northward of San Antonio bank.—This channel is not recommended, except in fine weather and with the buoy on San Antonio bank in sight and in position. The land in the vicinity of San Antonio point will first appear like detached trees, until a mound like a round island rises. Steer along the coast to the westward at a distance of 2 or 3 miles. San Antonio point will open when bearing about N. 83° W. (N. 72° W. mag.), and when it bears N. 60° W. (N. 49° W. mag.), steer for it. When 1½ miles from the lighthouse, and about ½ mile from the shore, keep at that distance from the latter, make allowance for the tide, and a vessel will pass the north end of San Antonio bank, marked by a buoy, and may haul round fort San Antonio, and not less than 600 yards distant, for the anchorage. Between San Antonio and fort Sta. Maria, the coast should not be approached within ½ mile, to avoid the 9-foot rock nearly 600 yards from the shore.

A sailing vessel leaving Bahia with a southerly wind and bound to the northward will find the north channel convenient, as it saves a beat to the southward of 5 or 6 miles; but she should have a commanding breeze and make full allowance for the flood tide, which at times sets with great velocity towards San Antonio bank. The land wind generally fails or falls light under the high land of San Antonio point.

Southward of San Antonio bank.—The usual course, however, is round the south end of the San Antonio bank, with mount San Amaro, the highest hill of San Amaro island, on with the first hill in the plain of Conceição, bearing N. 73° W. (N. 62° W. mag.). (Mount San Amaro is a saddle peak, the two parts of the saddle being of equal height; mount Conceição is a round hill with trees on its summit.) The bank should not be approached nearer than 12 fathoms water; and the distance of at least 5 miles from the cape should also be carefully estimated and a lead kept constantly going. When Mont Serrat point comes open of fort Sta. Maria, bearing N. 12° E. (N. 23° E. mag.), a vessel will be ¾ mile to the westward of the bank, and may steer for the anchorage as before directed.

In working, a vessel should not stand farther eastward than to bring the church of Bomfim on with cape San Antonio, nor to the westward nearer Itaparica island than about 2½ miles. Jaburu point, the east extreme of the island, mount San Amaro, San Antonio point, etc., will be easily recognized. In approaching the parallel of the lighthouse especial care should be taken not to stand too far westward, as the channel is narrowed to 2½ miles in breadth, and several vessels have grounded on Baixo Grande and the banks to the southeastward, by standing too close to Na. Sa. da Peña point. The reefs are not always indicated by breakers, as in fine weather and at the moment of high water the sea sometimes does not break.

Rivers.—The principal rivers which flow into Bahia de Todos os Santos are the Serigi, or Sergipe, navigable 9 miles above its mouth, the San Francisco and the Para Guassu, the largest, which irrigates the land in its vicinity, and which is known by its richness and fertility. The source of the Para Guassu is in the serra da Chapada, and after several falls it passes the town of Cachoeira and empties itself into the NW. part of the bay. It is navigable to the above town at 54 miles from its mouth. The marshes of its banks are often inundated, which causes intermittent fevers; the water is not good for drinking and should not be used for several days after it is procured.

Itaparica island is on the west side of the entrance to Bahia. It supplies the market of Bahia with a great portion of its fruit and vegetables, and the interior abounds in cocoa trees, whose fruit is of a large size and forms an important article of trade; there are also manufactories for rope and other articles. The island has a population of about 20,000; the principal town and general mart at the northern end is defended by a fort.

Jaburu point.—On the east side, opposite the town of Bahia, are numbers of handsome looking houses. Jaburu point, the east extreme of the island, is bordered by extensive reefs with from 8 to 12 fathoms water close-to. The SE. shore of the island is skirted by reefs, and from Caixa Pregos point, its south end, the rocks extend off about 2¾ miles, with broken water, and a set towards Jaguaripe bar is generally felt, rendering an approach nearer than 5 miles dangerous.

Itaparica channel—Jaguaripe river.—The western entrance to Bahia is the Itaparica channel, formed by Caixa Pregos point and Garcia point on the mainland. It is said to be narrow, tortuous, shallow, and not easily distinguished, but is frequented by small vessels and coasters acquainted with its navigation. The Jaguaripe river has its source about 33 miles westward of the town of Cachoeira, and is navigable with the tide about 22 miles above its mouth.

Reefs.—Eastward of the channel is the Barra Falsa, a small inlet of the island between Aratuba and Caixa Pregos points. A coral reef lies off the coast at the distance of 2½ miles. Aratuba point, at a distance of more than 14 miles, has a similar form to that of San Antonio point, appearing, like the latter, to detach itself from the land westward of it. The whole of this part of the coast is bordered with shoals and rocks, and in places from the depth of 10 fathoms the water shoals rapidly. A vessel getting into less than 11 fathoms water should tack immediately.

Buoys.—The Barra Falsa has been marked by two buoys, red to starboard and black to port, entering. A pole with black ball marks Itaypabó rock in Itaparica channel; leave to port entering.

Rock.—A submerged rock, called Pedras de Caramuans, on which the English steamer *Tagus* struck, lies about 4½ miles eastward of the Barra Falsa, and is marked by a black buoy moored in 5½ fathoms of water. Vessels should not attempt to pass beween this buoy and the mainland, on account of the existence of other rocks.

NOTE.—This danger is presumably the 3-fathom spot shown on charts, as lying 2½ miles S. 40° E. (S. 29° E. mag.), of Aratuba point.

Coast.—Between Bahia and the Itacolomis the coast is of moderate height, composed alternately of sandy beaches, woody hillocks, and sometimes of reddish cliffs from 65 to 155 feet high. In the interior mountains whose summits range from about 1,600 to 2,000 feet high, but which, from their remoteness from the sea, appear from the offing above the horizon like isolated hills, are seen a little sooner than the coast.

La Serra Grande, in latitude about 14° 30′, between Ilheos and Contas, is the only group of mountains near the sea. The coast can be seen at a distance of 21 to 27 miles, according to the locality and the state of horizon. The mouths of the rivers will be known by the breakers on the bars, which extend off from one to 1½ miles. The remarkable points, in the absence of other observations, which serve to fix a vessel's position, are the morro de São Paulo, the paps of Boypéba, Quiepé isle, the high dark cliffs of Contas, the Serra Grande, Ilheos, the mountains of Commandatubu, the red cliffs of Porto Seguro, and lastly mount Pascoal.

The water all along this portion of the coast is deep, and at 2 miles from the shore there are from 11 to 16 fathoms; but in proportion as we advance to the southward the soundings diminish a little. The nature of the bottom is nearly the same at 2 or 3 miles from the shore—a mixture of sand and gravel, or coral and broken shell. A little mud is found near the mouths of some of the rivers, but this is rare.

There are coral banks in four different places at 2 or 3 miles from the coast, viz, between Bahia and the morro de São Paulo, eastward of Itaparica channel; Boypéba and Camamú; the Ilheos; and between Santa Cruz and Porto Seguro. With the exception of these four places the coast is safe, and a vessel may approach in moderate weather to a distance of 1½ or 2 miles in 6 fathoms water.

Morro de São Paulo.—From Garcia point the coast is low and sandy, bordered with reefs for about 15 miles to the entrance of the rio Una, and forms a deep bay. The SE. side of the entrance to the river is the north extremity of Tinharé island, named morro de São Paulo, a high, rugged, conspicuous headland projecting to the NE. and terminating in a nearly perpendicular cliff, with low land to the back and northward of it. On the summit of the cliff is a lighthouse, and at the extreme point of the base are the ruins of an extensive fort.

The land southward gradually declines in height, and at ½ mile SE. of the battery is a low islet; outside it, at the distance of 600 yards, is the north end of a reef of rocks which skirts the coast to the southward, steep-to, and on which the sea breaks heavily. The shore NW. of the morro forms a deep inlet easy of access, and affords shelter for a large number of vessels. At about 2 miles within is the village of Gamboa, and about 7 miles up the river, on the north bank, is the town of Valença, a thriving place, having a population of about 5,000, and in weekly communication with Bahia. The Una has many branches, with several small towns on their banks, and is navigable some distance for small steamers.

João Goncalves bank.—The entrance to the inlet NW. of the morro is contracted to about ¾ mile in width by an extensive sandbank bordering the low western shore at the distance of 2¼ miles; and at 1¼ miles southward of the morro the channel is narrowed to about 400 yards. The bank, on which the sea breaks, shoals gradually at the northern part, but is steep-to farther in, where the water suddenly shoals from about 4½ to 1½ fathoms; its south side is partly dry. At about 1½ miles SW. of the morro its edge trends to the westward; it is steep-to and terminates at the western point of entrance.

Channel.—The eastern shore of the channel immediately within the morro is steep-to; at the distance of about ½ mile to the south a bank commences and borders the shore to the southward at about 200 to 400 yards. In the SW. part of the inlet it trends to the northward, leaving a passage about ½ mile wide between it and the low western point of the inlet. Water may be obtained here in small quantities. Near Valença is the beginning of a natural canal which, at high tide, admits boats to navigate as far south as the Jiquié river, which has its outlet southward of Tinharé island.

Light.—On the high cliff at the northern extremity of morro de São Paulo is a lighthouse 80 feet high, painted white, which exhibits at the height of 272 feet above high water a *revolving* white light, visible in clear weather from a distance of 25 miles. The light revolves *every minute*, showing a flash for *fifteen seconds*, followed by an eclipse of *forty-five seconds*. At a distance less than 8 miles the eclipses are not total. The light has been seen from a distance of 32 miles. Sometimes, when the lighthouse is first seen above the horizon, it appears like a vessel under sail. The light is reported as making a complete revolution in forty-five seconds, instead of one minute.

Anchorage.—Anchorage will be found at ½ mile SW. of the morro, or anywhere off a red cliff SW. of the village in 5½ or 6 fathoms water; and, if necessary, a vessel can go higher up—where there is plenty of room for a large number of vessels—by steering along the southern shore. Vessels for the river should take a pilot. In working out with the ebb tide a vessel should not stand too near the coast of the morro.

Tides.—It is high water, full and change, in morro de São Paulo inlet at about 4h. 0m.; and the rise is 6½ feet. The ebb is much stronger and lasts longer than the flood; it sets rather towards the Morro point, along the coast by the old batteries, at the rate of one to 2 miles an hour, and sometimes 3 to 3½ miles.

Directions.—Vessels from the northward bound for the anchorage of morro de São Paulo should keep Bahia light bearing northward of N. 46° E. (N. 57° E. mag.) (the line joining the two lights), and not stand into less than 11 or 12 fathoms. When between two and three miles eastward of the Morro light, bring it to bear about S. 34° W. (S. 45° W. mag.) and steer in with the light a little on the port bow, gradually rounding it at a convenient distance, avoiding João Goncalves bank, extending from the western shore. In working in at night, a berth should be given to the reef SE. of the morro, as there are 8 fathoms water close to it.

The least depth in the fairway between the morro and bank on the western shore is about 5½ fathoms at low water, increasing to the SW. in places to 12 and 18 fathoms.

Coast.—At about 30 miles southward of morro de São Paulo is Muta point, the east extreme of a deep bay. From the morro the land declines in height to the southward, and at the distance of 5 or 6 miles is Garapua point, low and covered with dark green vegetation, by which it will be easily known; at 2 miles farther south is the little village of the same name, which is seen when passing near the coast. This part of the coast can be approached to the distance of one mile in 6 or 7 fathoms of water, sand, and broken coral. Southward of Garapua the coast is still lower, being a wooded plain as far as Boypéba island; the shallow water of 2½ and 3 fathoms does not admit vessels to approach nearer than 2 or 3 miles.

The land between the morro and Boypéba island is that of Tinharé island, separated from the continent by a deep canal, which connects the rio Jiquié with the rio Una and the port of the morro. The delta of the rio Jiquié forms two other islands, one named Tupiassu, lying between Tinharé and the continent, the other, Boypéba.

Boypéba, or As Villas, island.—About 15 miles southward of morro de São Paulo, at the extremity of a wooded plain, is a group of low, wooded hills appearing detached from the coast; this is Boypéba Island, named also As Villas, from its appearance; the land north and south of Boypéba is very low, by which the island will be known. The coast of Boypéba is bordered by a chain of reefs, which, from the SE. point of the island named Castelhanos, extends a mile from the land. At 2 miles from the point the depth is 7 fathoms, sand and coral.

At night a vessel should not approach nearer than 11 fathoms of water, as the soundings diminish rapidly. A little northward of Castelhanos point there is a small village near the mouth of a stream. On the NW. side of the island, on the borders of the canal which separates Tupiassu island, is the village of Boypéba Velha. The island is well cultivated, and carries on a small trade with Bahia.

Barra Carvalhos.—From Castelhanos point the shore of Boypéba island trends to the westward, and forms, at a distance of 4 or 5 miles, a right angle with the coast of Camamú, running north and south. Here at the head of the bite is the entrance to the canal which communicates with the rio Jiquié, the interior, and port of Morro de São Paulo. This entrance is named the Barra Carvalhos, and will be known by the hills of Boypéba and the low land of the continent.

SW. of Boypéba island is a small conical, isolated hill, and on its summit are cocoanut trees which from a distance appear as one; they can be seen 11 or 12 miles, and are useful as a mark for this part of the coast. Barra Carvalhos is practicable only for coasters of about 6 feet draft. Its approach is encumbered with large patches of coral, making it necessary to have a pilot.

Coast.—The coast between Boypéba and Camamú forms a bay 4 or 5 miles deep, terminating to the southward by the extensive reef named Sororo Cussu, which surrounds Quiepé isle. This bay is shallow, encumbered with detached banks of coral, and can not be navigated without a pilot. The shore is low, being a long beach of sand, with no object to mark it. Vessels bound to the southward should give Boypéba island a berth of at least 2 miles, and not approach the land until abreast of Quiepé isle.

In approaching the coast on this parallel there is no high land to mark the entrance to Camamú; but when about 15 miles from the land there will be seen in the NW. the wooded hills of Boypéba, in the west Quiepé isle, which appears like a group of trees divided into two parts, and the low point of Muta with a group of cocoanut trees on it. On a nearer approach the two low hills of Taipus, on the coast, at 4 or 5 miles south of the entrance to the port, will be seen.

Camamú.—The port of Camamú is one of the best on this part of the coast of Brazil, on account of its extent, depth, and shelter. Between Muta point and Sororo Cussu reef, extending from Quiepé isle, is the entrance to Barra da Enseada, which extends to the SW. to the confluence of the rivers Camamú, or Acarahi, and Marahu. The town of Camamú, defended by a fort, stands on the left bank of the Acarahi. It trades with Bahia, exporting coffee, spirits, rice, etc., and is in telegraphic communication with that place and Pernambuco. The population is about 2,000.

The navigable part of the port of Camamú is much contracted on the north by the reef and bank surrounding Quiepé isle, which extends to within a mile of Muta point. Northwestward of the point are two rocky banks with about 10 feet water on them. The port has from 3 to 9 fathoms water, and this latter depth will be found in the entrance of the Marahu. An islet, with several rocks, lies at the entrance of the Camamú, or Acarahi.

Muta point.—Rocks.—Muta point is low, sandy, and has a group of cocoanuts on it, which are clearly seen from the offing; it is clear of danger on the east and north sides, but S. 57° W. (S. 68° W. mag.), 600 yards from its extreme, is Sioba rock with about 2 feet on it at low water, and at 1½ miles SW. of the point and about 800 yards from the beach are the Itaipebas rocks, which dry at low water, with breakers nearly 400 yards north, and a shallow patch which occasionally breaks about ½ mile east of them. One mile SSW. of the point is the village of Barra Grande, consisting of about 20 houses.

Quiepé isle, about 330 yards in diameter, is covered with large trees reaching 155 feet above the level of the sea, visible at a distance of 14 miles and easily known by its isolation from the mainland westward, which is lower. It is surrounded on all sides by coral banks, the Sororo Cussu, extending one mile to the southward, 1½ miles eastward, and 2 miles east-northeastward, and which narrows very much the entrance to Camamú; the sea breaks all over the banks when the wind is fresh from the offing, and particularly when the tide is contrary to the wind.

Pragonas and Carocos banks.—These rocky banks lie from 1,200 to 1,400 yards NW. of the anchorage. The banks together are about ¾ mile in length east and west, with 10 feet on them at low water. The town of Camamú shut in with Pedreira point, the north extreme of Camamú island, leads southward of the banks.

Bank.—At the distance of ½ mile north of Itaipebas rock, and in mid-channel, there is a bank with a depth of 18 feet. As this bank is nearly on the leading mark care must be taken in proceeding westward of the outer anchorage to bring Camamú church midway between Pedreira point and Cavallo rocks. At 300 yards north of this bank there is another bank (Dawes bank) with 18 feet, but of greater extent.

Cavallo rocks.—At ½ mile northward of Pedreira point is a group of rocks, some of which are several feet above the sea; the highest has some resemblance to the head of a horse, from which it takes its name.

Barra Camamú.—Between Cavallo rocks and the coast is a channel having 1½ to 3 fathoms water; and there is a depth of from 2 to 3 fathoms between the rocks and Pedreira point. The latter channel is used by vessels bound to Camamú and is named Barra Camamú.

Camamú island, in the inner part of the port, is 3 miles in length north and south, and 2 miles in breadth. It is hilly, higher than the neighboring shore, and divided into three or four parts by narrow channels, but which are not even navigable for boats. The east side of this island forms the left bank of the rio Marahu.

The small village of Campinhos stands on the east shore of this river, at about 1¼ miles southward of Pedreira point, and here the depths are 7 and 8 fathoms, and the river ½ mile wide.

Rio Marahu runs nearly in a south direction, with the exception of one or two bends, until abreast the town of Barcellos, when it turns rather sharply to the SE, thence southerly 1¾ miles to the Marahu oil works at about 8 miles from the entrance. The village of Marahu is about 2 miles beyond the oil works, and has a population of about 2,000.

The river is navigable for vessels of 18 feet draft; pilots, however, can not be trusted for more than 9 feet draft.

Rio Camamú, or Acarahi.—The mouth of this river is formed by Camamú island and the mainland. It descends from the chain of the Aimores, and is navigable about 20 miles above the entrance. On its banks numerous sawyers are employed cutting timber, which is conveyed by the river to Camamú, for Bahia.

From Barra Camamú the water within deepens to 8 and 11 fathoms, when it again decreases. The river is much obstructed by shoals, and should not be entered without a pilot.

Anchorage.—Anchorage will be found in port Camamú in about 6 fathoms water, sandy bottom, a short mile westward of Muta point, or farther to the SW. It is necessary to ascertain the position of the bottom before anchoring, as there are several patches of rock.

There is anchorage farther in, off Campinho point, in 3¼ fathoms, at ½ mile from the shore, care being taken in proceeding to it to avoid the 3 fathom patch situated nearly on the leading mark. Coasters anchor on the bank off Barra Grande. If it be necessary to go westward of Campinho point, the services of a pilot should be obtained at Barra Grande, as there are many dangerous rocks in the way.

Supplies are tolerably cheap and plentiful, water is bad and scarce, firewood of an indifferent quality is abundant.

Fresh meat and vegetables can be procured from the village of Marahu by communicating with the agent at the oil works and giving a day's notice; fish are plentiful, but difficult to take, even with a seine.

Tides.—It is high water, full and change, in port Camamú at 4 h.; springs rise about 6½ feet. The tides are tolerably regular. The stream of the ebb, increased by the waters from the rivers which flow into the port, is much stronger than the flood; its average rate is from 1½ to 2 miles an hour, and sets toward Quiepé isle and reefs. When the wind is fresh from the offing the ebb causes a heavy sea across the whole breadth of the entrance between Muta point and the Sororo Cussu reefs.

Directions.—When bound to port Camamú, if from the northward, keep from 2 to 3 miles eastward of Boypéba island until on the parallel of Quiepé isle and in not less than 8 or 9 fathoms water; this precaution is necessary, as the swell from the offing and the current set on the reefs and toward the bay to the northward.

When about ENE. of Muta point, and having it in sight, the hills, the rocks off Pedreira point, and the north end of Camamú island will soon be seen, also the town of Camamú at 10 or 11 miles inland, standing on rather higher ground. Then bring the town touching Pedreira point, bearing S. 59° W. (S. 70° W. mag.), and steer for it, which will lead a vessel in midchannel nearly ½ mile northward of Muta point and a greater distance southward of the edge of Sororo Cussu reefs.

If the town of Camamú be not visible, a vessel may steer in and pass about ½ mile northward of Muta point and then steer for Pedreira point, bearing S. 59° W. (S. 70° W. mag.), and anchor in 5½ fathoms water, fine sandy bottom, on or to the southward of that bearing, at one mile from the beach of Barra Grande.

If proceeding up to the town of Camamú or Maharu oil works a pilot is necessary.

In leaving the port advantage should be taken of the land wind. In working out with the sea breeze, as the channel is narrowed by Sioba rock and Pragonas bank, the strength of the ebb tide, which sets out of the bay toward Sororo Cussu reef, should be taken into consideration, and a vessel should tack short of a line passing through the town of Camamú and Cavallo rocks.

In standing to the southward, do not go into less than 3½ or 4 fathoms water, with the town of Camamú just shut in with Pedreira point. With a fresh breeze from the offing and ebb tide, the sea resembles a line of breakers across the entrance of the bay. When clear of the port, and the route is to the northward, a vessel should steer 4 or 5 miles eastward of Quiepé isle, to avoid the set, swell, and shallow water in the bay north of that islet.

Coast.—The coast southward of Camamú is low, sandy, and covered at intervals with patches of vegetation and groups of cocoanut trees; it is clear of danger, and can be approached to a distance of one or 1½ miles, in 6 or 8 fathoms water. Off all the extent of coast between Camamú and Contas, a distance of 25 miles, the two low hills of Taipus are seen. The interior land is a little elevated, and offers no conspicuous object but the summits of serra Canastra, a small chain of mountains at 10 miles from the sea. This coast is named Terra d'Algodão.

Cape Tromba Grande.—At some miles southward of Camamú the low coast terminates in a peaked cape, and in the distance are the summits of the serra Grande de Contas. Cape Tromba Grande is a remarkable cliff of black rocks, 328 feet high, and an excellent mark for rio de Contas, of which it forms the south side of entrance, and is the beginning of the high land which extends south to serra Grande.

The mariner wishing to make the land in this vicinity need have no doubt as to its identity.

Rio de Contas is of little importance, and interrupted by numerous cataracts, but navigable for large canoes about 15 miles above its mouth, except immediately after heavy rains, when the stream is too rapid. The mouth of the river is covered to the east by the high land of Trombina point, and bounded on the west by the low coast and the sandbanks, which obstruct three-quarters of its entrance, leaving only a narrow channel close to Trombina point. The depth of this channel is 8 feet at low water and 14½ feet at high water. When the sea is smooth it is easy to enter; the mark for going in is the point north of Shere reef in line with the church, bearing about S. 60° W. (S. 71° W.

mag.); the water diminishes on the bar near the point, and then rapidly increases in the basin to 5½ and 6½ fathoms.

The high land south of the entrance is covered with trees, and the town of the same name stands in the bend of the coast at one mile SW. of the entrance to the river; when open it can be seen at a considerable distance, and is a good guide to the anchorage. It is the chief place of a district containing 3,000 inhabitants, the territory being reputed the most fertile on the coast. Coasters frequent this place for supplies.

Anchorage.—Off Contas, near the entrance to the river, there is anchorage in 8 or 9 fathoms water, mud. with cape Tromba Grande bearing south (S. 11° W. mag.), distant 2 miles, and Contas church S. 50° W. (S. 61° W. mag.), 1½ miles, at about one mile from the Trombina and one mile N. 14° E. (N. 25° E. mag.), of Pedra Branca rock. The depths diminish regularly toward the bar. If necessary, vessels may anchor farther out.

Tides and Current.—It is high water, full and change, in the rio de Contas at 4h. The stream of the ebb is rapid, averaging 3 or 4 miles an hour in the channel, which requires great caution in entering. During the NE. monsoon the coast current is stronger in this vicinity than any other part; a vessel bound northward should, therefore, gain an offing.

Pedra Branca.—There are two rocky banks off the mouth of rio de Contas; the most distant from the shore is the Pedra Branca, with about 3 feet of water on it at low tide. It lies about 700 yards eastward of the Trombina, and does not always break. Vessels should approach the bar from the northeastward.

Shere reef.—The second reef nearer the land and to the northward and eastward of Trombina point, is a large plateau of rocks uncovered at low water and always breaks. Its proximity to the shore, and the breakers, render it less dangerous than the Pedra Branca; vessels pass to the NW. of it, entering the Contas.

Coast.—At 30 miles southward of cape Tromba Grande is the little port of Ilheos. The land between cape Tromba Grande and Ilheos is high, with bluff points and peaked cliffs, steep, and safe to approach. At 5 miles southward of cape Tromba Grande, near a bold, steep point, the high land, receding from the shore for 3 miles, forms a deep valley from the middle of which two streams run into the sea. Between these streams near the sea is a small conical isolated hill, at the foot of which is the village of Tejuipe; at 2 miles south of the village is the high peaked land forming punta de Serra Grande.

Serra Grande.—The serra Grande is a chain of mountains running inland. Their principal summits, 1,640 feet high and 5 or 6 miles from the sea, are visible from the offing in clear weather more than 40 miles. The termination of this chain of mountains presents a sea front of elevated cliffs running 10 miles north and south. The north point of these cliffs is 9 miles south of cape Tromba Grande, near the village of Tejuipe. The point in the middle, the most salient, and known as punta de Serra Grande, is a little north of the parallel of the summits; it is steep-to. The south point of the cliffs is named punta del Ramo. The village of Memonan stands on a narrow neck at the foot of the high land north of punta del Ramo, but is of no importance.

Rio Itahipe.—Punta del Ramo terminates abruptly the high land of serra Grande, and then follows the Aba da Lagoa valley, 5 miles across, which separates the group of the Serra Grande from those of the Ilheos. This valley, larger and deeper than that to the north which separates the same group from the high land of Contas, is very noticeable from the offing.

In this valley is a large lake named Itahipe, and a river of the same name runs through it and empties into the sea. At 5 miles southward of this point the low land of the valley is terminated by a bluff, reddish point, the commencement of the high land of Ilheos.

St Jorge dos Ilheos.—Two slightly salient points form a small bay protected by a chain of islets and reefs inside which is fair anchorage. In the south part of the bay is the mouth of the rio Cachoeira, or Ilheos, which, in its course close to the sea, forms a peninsula. The south point of this peninsula is named morro da Matriz Velha, and its extreme point Fucinho do Cão (dog's nose).

The right bank of the river is very low, and terminates in an isolated wooded hill, 131 feet high, close to the water, named morro Pernambuco, which, being connected to the continent by a neck of land (Praia Zimbo) might at some distance be taken for an island. On the NW. side of this hill are the ruins of batteries which formerly defended the port.

The entrance to the river is between the morros, open to the north, and ¼ mile in breadth, but narrowed by the Coroa Capao sandbanks deposited by the stream of the river on the western side of the channel which, from 400 yards southeastward of Fucinho do Cão, extend along the coast, terminating at Rapa rocks, lying ½ mile northward of the morro Pernambuco and 600 yards from the shore of the town. In entering the Cachoeira, a vessel should bring the morro Pernambuco to bear about S. 23° W. (S. 34° W. mag.), and round it tolerably close to avoid the breakers on the western shore, where there is always much sea, and especially when the tide is running out against the wind.

Within Fucinho do Cão the river trends northward for about ¼ mile, and then westward. The channel along by morro Pernambuco has about 10 feet at low water and 16 feet at high water, but it deepens in the river to 6 and 8 fathoms, sand and mud.

The town of St. Jorge dos Ilheos stands on the NW. side of the morro do Matriz Velha, where supplies can be obtained at moderate prices. The only trade here is in timber, cut at different distances up the river and floated down for exportation.

Islets and reefs.—At about 1¼ miles north of the entrance to the Cachoeira is Pedra Grande point, where the land trends westward and northward, forming Trincheiras bay. Parallel to the coast, at about the distance of a mile, are a chain of islets and reefs nearly 2 miles in length. Ilheo Grande, or Verde, 62 feet high and 164 yards in diameter, is the largest and northernmost of the group. It lies at 1¼ miles NE. of Pedra Grande point. It is covered with trees, and can be seen at the distance of about 15 miles.

Ilheo Pequeno, or Arido, is about 200 yards SE. of the former with a passage between. At ¾ mile southeastward of the islets is a reef of rocks named Itaipins, which uncover, and the sea nearly always breaks on them. Itapitaugo rock lies southward, distant 1 2/10 miles from ilheo Grande. Sororoca reef is covered, but does not always break; it lies NE. by E. nearly one mile from the morro Pernambuco. This is the southernmost of the chain, and it forms with the morro the southern entrance to the outer anchorage.

These islets and reefs have channels of irregular depths between them, which can only be used with safety by boats.

Anchorage.—A good berth for anchorage is in 5 or 6 fathoms, mud and clay, with the north part of ilheo Pequeno, the outer isle, just open southward of ilheo Grande; or a more convenient anchorage for communicating with the village is farther south with Pernambuco point, bearing about S. 34° W. (S. 45° W. mag.), distant 1,200 yards.

Directions.—St. Jorge dos Ilheos is known, when on its parallel, by the serra Grande to the NW., and the two hills or morros of Pernambuco and Matriz; and on nearing it by a large white church standing about the middle of the ascent of the land, and the islets and rocks protecting the anchorage. A vessel may pass in north of ilheo Grande, or south of Sororoca reef, according to the prevailing wind. To steer in northward of ilheo Grande, which is steep-to, pass ¼ mile from it and anchor when convenient.

In steering in south of the reefs, the morro Pernambuco bearing west (N. 79° W. mag.) leads ½ mile southward of Sororoca reef; and when at the distance of ½ mile from the land, in not less than 5 fathoms water, steer to the NW., to the anchorage. Vessels, in leaving, can pass out north of the islets or south of the reefs, as convenient. The anchorage is most exposed at high water when the sea passes over the reefs.

In crossing the bar of the river, keep near the bluff south point of entrance; when the wind is fresh from the offing a sea sets in and breaks across the bar; the channel is then all but impracticable.

Tides.—It is high water, full and change, at Ilheos anchorage at 4 h.

Rio Ilheos, or Cachoeira, descends from the chain of the Aimores and runs into the bay of Ilheos, after being divided into two parts, about 30 miles above its mouth. It is unnavigable beyond 6 miles from St. Jorge, where there is a cataract, from which it takes its name. Its principal affluents are the Itape and Santa Anna.

Coast.—At about the distance of 62 miles nearly south from rio Ilheos is the rio Grande de Belmonte, with heavy breakers north and south of it. The coast between the two rivers runs about south, nearly straight; the northern part is of average height, formed alternately of wooded hills, small cliffs, and sandy beaches; but south of latitude 15° 20′ the land is low and wooded, with a white sandy beach as far as Belmonte, and backed at about 15 miles inland by the serras de Itaraça and Commandatuba, which extend north and south for 20 miles, between latitude 15° and 15° 25′.

The northern serra is 1,902 feet above the sea; the middle one 2,034; and the southernmost, named the morro de Commandatuba, 1968, is an isolated undulating mountain, easily known from the offing, and the best mark for this part of the coast; it is 8 or 10 miles from the middle one, and 16 miles from the sea, in latitude 15° 21′. These mountains will generally be seen about 36 miles from the offing. All this part of the coast can be approached to a distance of 1½ or 2 miles. Between Ilheos and Olivença there are some small detached banks of coral, extending nearly a mile from the shore; but south of latitude 15° 15′ the coast may be approached to one or 1½ miles in 6 or 8 fathoms water. At 3 miles off there are 17 and 19 fathoms.

Olivença, a small Indian village about 8 miles south of Ilheos, is built on the summit and towards the north of a hill near the sea; the church of Notre Dame Escalier is on the highest part, and looks like a long stone staircase, from which it takes its name. Seen from the offing the village is conspicuous and appears like a single line of houses descending the hill to the north. Numerous cattle are seen grazing here. In the vicinity, ¾ mile from the shore, are some reefs on which the sea occasionally breaks. The coast here should be approached with caution.

The coast is broken by the mouths of numerous rivers, which are known when passing at about a mile from the shore by the breakers on the bars, and by groups of houses built generally in their vicinity; but they are not of much importance, and, as well as the several villages along the coast, their names are often uncertain. Southward of Olivença is the entrance to the rio Una, with breakers at 500 yards from the shore.

At 2 and 4 miles to the southward are two other rivers, probably the Jari and the Itapuan, between which is a low salient point, covered with groups of trees. Some Indian huts are sheltered under the cocoanut trees. The rio Aqui has a small village north of the bar, and at one mile south of it is a bank of coral and sand, which extends off nearly a mile. The mouth of the rio Messo is 5 miles southward of the Aqui, and 2 miles north of it are some woody cliffs from about 80 to 100 feet high, with a small triangular white spot, which is very remarkable from the offing.

Rio Una Mirim, about 6 miles south of the *Una*, has a village north of the bar, and 3 miles south of it is the mouth of another river, probably the Aracari. Farther on is the mouth of rio Muruim, with groups of houses north and south of the bar. Between the latter two rivers is a conspicuous point, where the white sandy beach terminates and the forest bordering the coast commences. A little to the southward of the Muruim the hills and cliffs terminate, and the low land in the neighborhood of the rio Commandatuba begins. In the interior, south of the serra Commandatuba, the country is a plain.

Rio Commandatuba is a small river descending from the chain of mountains of the same name; the bar is shallow, and accessible only at high water and in calm weather to the smallest coasters. This part of the coast is low, with lagoons extending along the coast a mile inland; these lagoons communicate with the sea, and form low islets, on which are several houses and the village of Boa Ventura. An Indian village stands at the mouth of the river, and the village of Commandatuba, also peopled by Indians, is 2 miles above the bar. Boats can go 2 miles above the village. The German colony Monitz is established on the river.

Rio Poxim admits boats at high water; it communicates with the lagoons, on the north with the rio Commandatuba, on the south with the Barra de Canavieras and the rio Patype.

Barra de Canavieras, or mouth of the rio Pardo, or Patype, is the most important southward of Ilheos. The land in its vicinity is very low, but the river is easily known by a white tower on the north point of entrance, and which appears detached from the dark verdure of the coast, especially when the sun shines on it. A sandbank obstructs its entrance, but at high water there are three different channels, one on the north, one on the south, and another in the middle of the bank; this last is the deepest, which at high tide has from 15 to 16 feet water. Vessels anchor off the port in 5½ fathoms, mud, with the tower about west distant about one or 1½ miles.

This port is frequented by small coasters, and a bar master is always ready for the service of vessels when they appear off it. The town of Canavieras stands on the left bank. The source of the river is in the province of Minass Geraes, where it divides into branches, one of which, the rio Cachoeira, empties at Ilheos, whilst the other branch, the rio Pardo, or Patype, runs into the sea at the bar of Canavieras. At some miles above the bar the Patype communicates, by a natural canal named rio Salsa, with the rio Grande de Belmonte. During the rainy season it forms a second communication nearer the sea, by the rio Jundia-hi.

The rio Pardo separates the provinces of Ilheos and Porto Seguro. The coast southward of Canavieras is low, wooded, and broken by the entrances into the lagoon, with here and there some small villages of no importance. They are named Jundia-hi, Porto da Junte, Embarca, Farina, Poço, and the Barro do Rio Marineiro. With the exception of the serras of Commandatuba, which are seen in the horizon to the NW., there is no high land, the country being flat and marshy.

Rio Grande de Belmonte, or Jequitinhona, is one of the largest rivers in Brazil. Its principal affluents are the rivers Macauba, Itucambira, Vacari, Salinas, Aracuahi, etc. Its bed is uneven, and it has two remarkable cataracts. The river can be ascended to 240 miles from its mouth, but its navigation is little known. It produces numerous fish, particularly a large species of shrimps.

The bar of the rio Grande de Belmonte has between 6 and 7 feet over it at high water; it often changes; the shoals extend off upwards of a mile; it is at all times dangerous, and after the rain the current sets out very strong. A pilot is stationed at the entrance to direct vessels in entering, by waving a flag to starboard or port, and holding it upright when steering the proper course. The river should be approached on a N. 42° W. (N. 31° W. mag.) bearing. Anchorage will be found off the bar in 6½ or 7 fathoms water, with the village bearing about S. 71° W. (S. 82° W. mag.).

Light.—On the south side of rio Grande de Belmonte stands a square white tower 43 feet high, from which, at an elevation of 59 feet, is exhibited a *fixed* white light, visible in clear weather from a distance of 10 miles.

Belmonte, with a population of about 800 inhabitants, stands on the south point of entrance to the rio Grande de Belmonte, the most easterly point south of Bahia, but from the uniformity of the land and the town being surrounded by cocoanut trees it is difficult to find from the offing. To the south of the entrance are some low hills, and breakers extend a mile from the bar. In the middle of the breakers, at the north point of entrance, is a small sandy islet visible 5 or 6 miles, and if coming from the southward the remarkable group of trees is a good guide. The river will be known by a small opening in the sand, and about 10 miles from its mouth the water is sometimes much discolored by large reddish spots.

Coast.—At 5 miles south of Belmonte the rio Mugiquiçaba, the principal of several small rivers on this part of the coast, discharges in a small bay named Conchas, known by a group of isolated trees on the shore, resembling at a distance a large rock or islet. This part of the coast, although low, is higher than that to the northward. In the interior are some low hills, covered with trees, and which rise gradually in height to the southward. When the weather is clear the two mountains Dos Irmãos will be seen about 20 miles from the coast.

Off the remarkable group of trees in Conchas bay, which are conspicuous from the offing, there is a depth of 5 fathoms at the distance of 4 miles. This shallow water continues south, at a greater distance from the coast, for 7 miles, when the edge of the bank trends toward Araripe reef off San Antonio point, northward of Santa Cruz.

San Antonio point.—Araripe reef.—A line of coral reefs borders the shore from San Antonio point to as far south as the parallel of the church of Santa Cruz, a distance of 7 miles. The northernmost reef, named Araripe, surrounds San Antonio point at the distance of 3½ miles and is partly uncovered. From thence southward the reefs continue in detached patches along a low and uniform coast, with nothing to mark it, and which should not be approached nearer than 4 miles, and when the winds are light the sea does not always break on the outer reefs; they are steep-to, and the lead is the only guide.

There are passages between these reefs leading to San Antonio, Santa Cruz, and Cabral bays.

Santa Cruz bay, at the northern part of an indentation about 7 miles in length and 1¾ miles deep, is protected by the southern reefs of the line which borders the coast from the northward. Between these reefs and the shore of Santa Cruz there is a clear space of about 2 miles, with 6 fathoms water, sandy bottom, in the outer part, and 2½ fathoms in the inner. The coast of the bay about midway is of moderate height, with some woody hills, from 100 to 130 feet high, leaving between them a depression in the land, forming the bed of the rio Juan de Tiba, and which is remarkable from the offing. On the highland over the north point of the river is a conspicuous tree.

The beach of sand which forms the shore of the bay is interrupted by two chains of rocks; one commencing at the foot of the town extends along the coast for 2 miles to the north, and forms, as it were, a quay along the right bank of the river; the second chain is midway between the former and the north point of the bay.

Itassepanema reef lies NE. by N. and SW. by S., 2 miles in length and ½ mile across; it is nearly all uncovered, with the Coroa Alta, a sandy islet, rising from the middle, and lies NE. of Santa Cruz bay, with its outer edge 1¾ miles from San Antonio point. Close westward is a small channel, having 10 to 13 feet, navigable for coasters. Between its south end and Alagadas reef is the Boquerão Grande channel, ¾ mile wide and 6½ fathoms deep.

The Alagadas are two reefs, each about ½ mile in length, with the Boquerão Pequeno channel between them, about 600 yards in breadth, with depth of 8 fathoms. They are steep-to, and do not always break. The south extreme of Alagadas lies N. 82° E. (S. 87° E. mag.) the church of Santa Cruz, and is the north boundary of the passage to the bay.

Cabral bay, situated about 4 miles southward of Santa Cruz bay, in the same indentation, has in its center a depth of 4½ fathoms; a stream of good water flows into it. Cabral bay is celebrated in history as the landing place of Pedro Alvarez Cabral, two days after he discovered Brazil by sighting mount Pascoal and the coast of the rio do Frade, on April 24, 1500. From Vermelha point, the south extreme of the bay, a reef which uncovers at low tide extends about ¾ mile to the northward, forming to the westward a little port sheltered from southerly winds. Close to the point is an islet of red sand.

Vermelha bank, about 50 yards in extent, with 10 to 13 feet over it at low water, and on which the sea rarely breaks, lies about 1½ miles from the point of the same name and about 1,200 yards off the extreme of Vermelha Point reef. This shoal forms the southern limit of the principal passage to the bay, and bears S. 45° E. (S. 34° E. mag.) of the church of Santa Cruz. In the channel between it and Vermelha Point reef there is a depth of 6 fathoms water and 6 to 7½ fathoms all round it.

Buoy.—A buoy, with staff and flag, marks the northern edge of Vermelha bank.

Ina rock.—About ½ mile southward of Vermelha point is Ina point. At about 1½ miles from the shore, and the same distance eastward of Ina point, is a detached rock named Ina, with about 10 feet water, on which the sea rarely breaks. There is a depth of 9 fathoms between it and the shore.

Anchorages.—The best berth in Sânta Cruz bay is with the point of the reef at the entrance to the river, in line with the conspicuous tree on the hill, bearing N. 71° W. (N. 60° W. mag.) distant ½ mile, in about 4 fathoms, muddy bottom and good holding ground. A good berth in Cabral bay will be with the north extreme of Vermelha Point reef about S. 14° E. (S. 3° E. mag.) distant one mile, in 5 fathoms, fine muddy sand, or, if convenient, a little farther in. Vessels should anchor in Santa Cruz bay with the wind from north to east, though the sea is never heavy even with SE. winds, but with the latter winds, Cabral bay should be used.

Tides.—It is high water, full and change, in Santa Cruz bay at 3h. 40m.

Directions.—When bound to Santa Cruz from the northward, a vessel's position can be verified by the serra de Commandatuba; and when from the southward, by mount Pascoal and the high red cliffs of Porto Seguro; if from the offing, the land should be made according to the prevailing winds. If low, woody land be seen first, the vessel will be to the north of Santa Cruz; but if hills of moderate height and red cliffs to the southward, she will be to the southward and in sight of Porto Seguro. On sighting land near the parallel of Santa Cruz, and at 15 to 18 miles distant, a break in the coast will be seen indicating the entrance to Santa Cruz river; the two green slopes of the hill contrast with the red roofs of the church and village.

On the northern hill will be seen the large isolated tree, and in clear weather the two hills Dos Irmãos. When at a distance of 5 or 6 miles from the church, bring it to bear N. 76° W. (N. 65° W. mag.) and steer for it, which will lead in midway between the Alagadas reefs on the north and Vermelha bank on the south. When the vessel is within 2 miles of the shore, she may haul up for the anchorage off the mouth of the river, or steer to the south for that of Cabral bay.

In working into the bay a vessel should not stand farther north towards the Alagadas, than to bring the church of Santa Cruz to bear S. 87° W. (N. 82° W. mag.) nor to the south, towards the Vermelha, than to bring the church to bear N. 59° W. (N. 48° W. mag.). Under favorable circumstances, and if the buoy of the Vermelha bank is in its place, a vessel may pass between it and the extremity of the Coroa Vermelha.

Rio Santa Cruz, or Juan de Tiba, rises in the chain of the Aimores, and flows into the sea in Santa Cruz bay. It is navigable from its mouth to within 30 miles of its source. The rocks which extend from the foot of the village of Santa Cruz to the northward, parallel to the shore, form a natural barrier, and may be considered a continuation of the river's right bank to the entrance. Here, at 2 miles from the village, the river flows into the bay by a channel about 110 yards wide and 14 feet deep at high water, with 8 to 10 feet nearer the village.

Small vessels can make good repairs here, although a chop of a sea is sometimes felt when the wind and tide are contrary, but the swell from the offing is broken by the outer reefs. The line of rocks is broken in the middle, affording access for boats. The left bank, at the entrance of the river, is a low shore covered with mangrove trees, and at 100 yards inland are some pools and a rivulet of soft water descending from the neighboring hills.

Village.—The village of Santa Cruz is situated on the site where, in the year 1500, Cabral fixed the cross, as a sign of his having taken possession of the continent, which he had discovered, in the name of the King of Portugal. He named it Santa Cruz, and it was about the middle of the sixteenth century that this name was changed for that of Brazil; but the village preserved its original name and the bay that of the navigator.

The village of Santa Cruz was founded in 1536 by Pedro de Tourinho. It has been destroyed many times by the Aimores Indians, and has never acquired any importance, notwithstanding the convenience of the bays. It stands partly on the summit of a hill about 130 feet above the level of the sea and partly on the low coast, in the middle of some groups of cocoanut trees. The red roofs of the houses and church are seen from several miles seaward. Trade is very limited, merely the exportation of a little wood and fruit.

Coast.—From Vermelha point the shore trends to the south for about ½ mile to Ina point, and at one mile farther on to the equally low point of Muta or punta Grande, thence in a southwesterly direction to Porto Seguro, which is 9 miles southward of Santa Cruz. In this space two small rivers run into the sea—the rio Manguinha a little west of Muta point, and the San Francisco at one mile north of Porto Seguro.

At a mile within Muta point, to the middle to the small red cliffs visible from the offing, a chain of hills rises parallel to the shore, which increase in height to the southward, presenting some small red cliffs, with groups of cocoanut trees. This chain of hills terminates abruptly at Porto Seguro, where the land forms a marshy valley, bounded to the south by coast similar to that northward.

This valley is apparent from the offing, and is the bed for the rio Buranhen, near the mounth of which is the town of Porto Seguro. South of the town are the high red cliffs known as the Barreiras de Porto Seguro, and visible from 25 to 30 miles; they form, with the above valley and mount Pascoal, marks which can not be mistaken. Porto Seguro may also be known by the church of Nossa Senhora da Peña, or Matriz, situated on the height to the north of the town. It is white and conspicuous when the sun shines on it, especially in the morning.

The Malembar, a large isolated tree, stands on the crest of the coast at one mile north of the church, and is clearly defined. There is also another church on the hill south of the valley, named Nossa Senhora da Judea, which is rather less conspicuous than that of Porto Seguro. It is visible when bearing SW. or west, but is masked by the trees in coming from the southward.

Porto Seguro reefs.—From Cabral bay the low shore southwad to Porto Seguro is skirted by extensive reefs. Porto Seguro reef lies between the place of the same name and Muta point, at 4½ miles north of it, with the outer edge upward of 4 miles from the coast. Some parts of it uncover or break continually. The outher part of the reef is named Baixo da Fora; the SW. part, near the port, consisting of some detached patches, Sororoca; and the south part of the same reef, which breaks, Itassepanema. There is a narrow winding channel between the outer and the coast reefs, at the distance from ½ to ¾ mile from the shore, leading to Porto Seguro. It is only particable for small steamboats with very good pilots.

The church of Santa Cruz, bearing N. 25° W. (N. 15° W. mag.), leads close to its NE. edge, which is a little outside the line of that town and Vermelha Point reef; the southern edge is near the parallel of Malembar tree; and the SE. edge is in line with mount Pascoal and the north end of the red cliffs of Porto Seguro.

Clearing mark.—When the weather is clear the best mark for passing eastward of the reef is mount Pascoal well open south of the red cliffs of Porto Seguro, which leads 2 miles to the eastward. At night they should not be approached nearer than 3 miles or to a less depth than 15 fathoms. There are from 7 to 8 fathoms, sand and coral, close to these dangers.

Porto Seguro, at the entrance to the rio Buranhen (ancient Cachoeira), is fronted by a ledge of rocks parallel to the shore for the distance of about ½ mile, and forms, at the north end of it, a channel into the river about 110 yards in breadth, 14 feet deep at high water, and 6 feet at low water. At one mile above the town there is about 12 feet at high water. The left bank is a broad sandy beach, at the end of which is the town at the foot of the hills.

The town, containing about 3,000 inhabitants, is formed of three adjoining villages, Pontinha, Marcos, and Pacata, and stands on the sandy banks of the river, but chiefly behind the elevated land north of it.

Anchorage.—The anchorage is ½ mile eastward of the extremity of the rocks which form the entrance to the port, with the church bearing N. 70° W. (N. 60° W. mag.) and the red cliffs of Porto Seguro S. 20° W. (S. 30° W. mag.), in 5½ to 6½ fathoms, sand and mud, good holding ground. It is well sheltered, with the winds from north to east, by the reefs which trend northward and nearly join those of Porto Seguro, but it is open to the south and SE., and in strong winds exposed to a heavy sea from that quarter. A vessel would be in danger if surprised by a gale from this latter direction, and should be prepared to leave should the wind freshen. But very bad weather on this coast is rare, and during the worst season, that of June, July, and August, there is little to fear but the squalls from the SW., which are of short duration and seldom sufficiently strong to be dangerous.

A large number of fishing vessels belonging to the port are employed in the vicinity of the Abrolhos isles. The principal fish is of the salmon species, which is salted for the Bahia market.

Directions.—Vessels bound to Porto Seguro from the northward should steer along the coast at a distance of 8 or 10 miles in 16 to 20 fathoms: the serra de Commandatuba and the red roofed houses of Santa Cruz will be seen, and, in advancing to the southward, the white church of Porto Seguro at a distance of 15 miles. Soon after, if the weather be clear, mount Pascoal will appear in the horizon like an isolated round hill, and in the same direction the red cliffs of Porto Seguro. When these latter objects are seen, mount Pascoal should be brought open south of the cliffs, and well open if the wind and swell are toward the shore. When the church of Porto Seguro bears northward of N. 81° W. (N. 71° W. mag.) steer for it to the anchorage.

If from the offing without having made the land either north or south, steer on about the parallel of 16° 25′, and when at about 30 miles from the coast the land will appear broken by the deep valley of the rio Buranhen, and on nearing it the landmarks previously described will be seen, when a vessel can proceed as before. If from the south or SE., mount Pascoal and the red cliffs will leave no doubt as to the vessel's position.

Coast.—The coast from Porto Seguro trends in a southerly direction for 19½ miles to Joacema, a white cliffy point. At nearly 3 miles southward of Porto Seguro church is that of Nossa Senhora da Judea, which is conspicuous and forms a good mark; a little northward commences a series of hills, occasionally wooded, and at 1½ miles southward is the commencement of the Barreiras de Porto Seguro, steep red cliffs 130 to 165 feet high, and which are visible some distance seaward; they extend to the southward for 3 miles, where they are broken by the rio Trancoso.

At 7 miles farther on is the Barra do Frade, and about 4½ miles beyond is Joacema point. In this latter space the coast is broken and uneven, presenting alternately wooded ravines and small white cliffs, which become more white as the point is approached.

Rio Trancoso and Rio Frade.—The rio Trancoso runs into the sea through a valley about 1½ miles in breadth, separating the northern from the southern portion of the red cliffs. A village of the same name (chief of a district containing 1,500 inhabitants) is situated on the hill on the south side of the valley, surrounded by cocoanut trees, and visible from the offing. At the commencement of the Barreiras, Pitanga rivulet runs into the sea.

To the south of the Trancoso are some red cliffs about 2 miles in extent, whence the coast becomes lower, forming a valley through which, along the hills to the southward, the rio Frade runs into the sea at 7 miles from Trancoso. Rio Frade is navigable only for boats, and its bar is dangerous. Itaquena point, 2½ miles north of the entrance, is low and wooded, with a few houses on it; a stream discharges at the point. The south point of entrance is bold and projects a mile seaward.

Joacema (Insuacome) point is rendered remarkable by two or three white scarped cliffs, which form, as it were, steps to the south. The white cliffs are the first of the kind in coming from the north. The coast north of the point may be approached to the distance of a mile.

The low, broken point of Corunbao lies south of Joacema, distant 7 miles, the shore between forming a bay about 2 miles deep. In the southern part of the bay the rio Corunbao enters the sea, and there are some houses SE. of it. The point is surrounded by Itacolomis reefs.

It is high water, full and change, in the vicinity of Joacema point at 3h. 30m.

Joacema and Pitiassu reefs.—The Joacema reef, about 200 yards in diameter, has about 3 feet over it at low water, is composed of sand and coral, and lies ½ mile south of the point, with 10 feet water in the channel between; there is a depth of 12 feet between the bank and coast, 21 feet in the channel it forms with the Pitiassu, at about ¾ mile south of it, and nearly 4 fathoms at 400 yards eastward of it.

The Pitiassu reef is larger than Joacema, being ½ mile in diameter, with about 2 feet at low water; it lies 2 miles southward of the point and 1¼ miles southeastward of Juricuara point. Between it and the coast there is a depth of 3½ to 4½ fathoms, sand and mud; and in all other directions, at the distance of 200 yards, 5 or 5½ fathoms.

Anchorage.—Within these reefs the shore is clear of danger and there is good anchorage for small vessels, and better than that of Porto Seguro; it is well sheltered from all winds, and protected against the swell from the south and SE. by the Itacolomis reefs, and from the east and NE. by the Joacema and Pitiassu reefs and coast. The access is easy, so also is communication with the shore; landing may be made in the creek inside the point, or in the river at favorable times of the tides. On the shore west of the point, at about a hundred paces from the sea, is a small lake of soft water.

Coast.—The coast from Joacema point southward is formed of small hills of less height than the land to the northward; and further south is the mouth of the rio Cramimuan, with Juricuara point, remarkable by its red color, between. From the Cramimuan the shore is low and woody as far as Corunboa point, 5 miles to the SE.

Rio Cramimuan.—The entrance to this river, 6 feet deep, is known by the hills north of it, Juricuara point, and by some large groups of cocoanut trees sheltering the village of Cramimuan, at a mile from the shore, on the right bank of the river.

Directions.—In fine weather a vessel will find temporary anchorage in about 5 fathoms, mud and good holding ground, at ¾ mile SE. of Joacema point and about the same distance eastward of Joacema reef; but in a fresh breeze a vessel should anchor inside the Pitiassu, or between it and the coast, passing in either north or south of the reef. When the tide is low the breakers indicate sufficiently the position of the rocks, but at high water care must be taken to avoid them.

Mount Pascoal, a remarkable peak 1,758 feet high, forms part of a group of hills lying nearly in a north and south direction. When seen from the NE. or eastward it is like an isolated round hill, slightly conical, and higher than the surrounding land; but from the SE. it appears connected by many other hills, less elevated, and one remarkable peak in the form of a large cylinder or tower on the summit of the mountain. This is Juan de Leao peak, and appears a little higher than that mountain. These are the only summits in sight from the offing that are seen between serras de Commandatuba and the high land of Espirito Santo. Mount Pascoal may be seen at a great distance, and from its height and isolation is a most useful landmark for this part of the coast.

Itacolomis reef is a cluster of rocks, several of which are uncovered at low water, rising from a sandbank which extends north and south for a distance of 7 miles, with its southern edge 5 miles to the SE. of Corunbao point. In the middle of the bank the numerous patches of coral are much broken, and uncover at low water; but towards the edge it is less broken, becomes covered, and the water deepens from the center. The reef is steep-to, rising perpendicular from a uniform bottom of 8 to 12 fathoms deep, and about the same depth is found at 3 miles from it; the soundings within this distance will not, therefore, indicate an approach to these dangers. The center of the reef is on the parallel of mount Pascoal.

There is a depth of 12 fathoms water about ¾ mile from the outer edge of the bank, and the same depth will be found about 5 miles SE. of it. About the middle of the edge there are 5 and 8 fathoms close-to. By not going into a less depth than 17 fathoms a vessel will be more than 3 miles from the reef, and during night it will be prudent not to go nearer than 20 or 22 fathoms water.

Itacolomis channel and Corunbao point.—Corunbao point is bare, very low, covered for quite a distance at high water, and forms the delta of several small rivers. It is situated within the middle of the reef, and separated from its western edge by a channel about 110 yards wide, with 2¾ to 5 fathoms; but it is tortuous, unfit for general navigation, and only practicable for small steamers having good pilots. The most favorable time for using the channel is at low water, when the reefs are uncovered. Small steamers bound to the northward with a strong breeze find smooth water in this channel.

From Corunbao point the shore trends to the southwestward, and with the edge of the reef forms a tolerably large angular space, where there is anchorage in about 5 fathoms, sand and mud, good holding ground, and sheltered from all winds except the south.

Coast.—The coast from Corunbao point trends a little southwestward and then south to Prado and Alcobaça. In the first part between Corunbao point and Comoxatiba, a distance of 14 miles, the coast is formed alternately of sandy beaches and four cliffs at about equal distances. The Barreiras de Cahy, at 7 miles southward of Corunbao point, are large, white, remarkable cliffs, and serve as a mark, conjointly with a large tree showing above the woody coast, for the Itacolomis channel.

The tree known by the name of Maruhim stands near the shore midway between Corunbao and Matto Grosso point, at 2 miles southward of the former. At about 3 miles southward of Barreiras de Cahy is the Barreira de Tahua, a low reddish cliff. The Barreiras d'Imbossuaba are also red cliffs, in latitude about 17° 4′, in a small bay; they are visible from the SE. Streams of no importance run into the sea between the different cliffs.

Patachos reef.—A chain of detached reefs extends along this coast at a distance of 2 or 3 miles, nearly on the meridian of Corunbao point, with anchorage inside them for moderate sized vessels. The two southern of these reefs are named Patachos, and uncover at low water. At one mile northward of Patachos reef is Tahua reef, between which and Corunbao point are several isolated patches. At high water these reefs are covered, and the coast should not be approached in a less depth than 8 fathoms.

Port Comoxatiba.—A chain of reefs bordering the coast southward of the Patachos forms at Comoxatiba a small basin, ½ mile in extent and 16 to 20 feet deep, and where a dozen coasters may find good shelter and smooth water even with a fresh breeze from the NE. When the water is high it passes over the reefs, causing a little swell. A pleasant sandy beach, through which some rivulets run into the sea, forms the head of the port and a hamlet and some cocoanut trees stand on the south end of the beach. On the highest hill, in the midst of thick vegetation, are the ruins of the ancient village and church of Colombiana.

Outside the port, along the reef, are depths of 5½ fathoms, sand and mud, increasing to 11 fathoms, mud, at 4 miles; but farther off at a distance of 17 to 24 miles, nearly on the same parallel, are depths of 10 and 13 fathoms, over sand, sand and gravel, or madrepores and broken shell.

Comoxatiba point is easily known from the offing, as it is situated 3 miles northward of the extremity of the red cliffs of Prado. This point is covered with vegetation, which masks the hamlet near the shore.

A fishing village composed of about a dozen houses, named Dos Irmãos, stands in a ravine near the commencement of Prado cliffs, and is approached through a break in the reef.

Tides.—It is high water, full and change, in port Comoxatiba at 3h. 30m., and the rise is from 5 to 6 feet.

Barreiras do Prado.—The coast from Comoxatiba point trends a little westerly, and then nearly south, presenting a series of very remarkable uninterrupted red cliffs from 200 to 270 feet high and 9 miles in length. These cliffs begin near the hamlet of Dos Irmãos and extend southward to within 2½ miles of the village of Prado, from which they take their name, and being visible some distance they are the best mark for vessels navigating near the coast.

An uninterrupted chain of rocks, about ½ a mile from the shore, extends along these cliffs from Comoxatiba to their southern extremity, where they terminate in front of the south point of the cliffs in a large patch of coral, named Calcoes Fora, in latitude 17° 17′. At 3 miles from the Barreiras do Prado there are depths of 6 to 8 fathoms, sand and mud.

No trace of habitation is seen along these cliffs, and the only remarkable break is that where the rio Japara runs in the sea, at about 3 miles from their northern end. This is the last elevated coast land seen coming from the north for a considerable distance, as from here to Espirito Santo, an extent of about 180 miles, the coast is nothing more than a low beach, with here and there some scanty vegetation, and visible from 8 to 12 miles.

In front of this low land the bottom rises suddenly and forms a vast plateau of about 150 miles in length and 120 in breadth, which is the base of the Abrolhos islets and reefs. This plateau, a species of granite, with irregular depths, rises abruptly like a wall from the depth of the ocean.

Prado.—This town contains about 1,000 inhabitants, and stands one mile north of the mouth of the rio Jucurussu, on a tongue of land formed by the river, running parallel with the coast for about that distance. The surrounding country is fertile and produces large quantities of manioc, besides which the town exports wood and salt fish (groupas taken in the neighborhood of the Abrolhos isles); but few other supplies can be procured.

The bar of the Jucurussu is dangerous even in fine weather. In the river at 6 miles from the town the depths are from 6 to 13 feet, and it is navigable for boats to 18 miles from the sea, where it divides into two small branches, named the rio do Norte and the rio do Sul.

Prado, Guaratibas, and Timbebas reefs.—At 3½ miles E. by S. of the town of Prado is the north end of a dangerous reef, 110 yards in extent, of the same name, and which uncovers. There is a depth of 6 fathoms, sand and mud, at about ½ mile outside it, and 2¼ fathoms at a mile northward.

At 3 miles SSE. ½ E. of Prado reef is Guaratibas reef, with 5½ fathoms between, which also uncovers, with its outer edge 3½ miles from the point of the same name. It is a mile long north and south, 200 yards in breadth, and separated into two parts by a narrow channel having 4¼ fathoms of water. A sandbank stretches to the westward for 2 miles, thence south for 3 miles, with a depth of 1½ to 2½ fathoms; there is a passage for coasters inside it.

At 7 miles S. 70° E. (S. 60° E. mag.) of the northern part of Guaratibas reef, and 10 miles from the shore, is the NW. end of Timbebas reef, with 8 and 10 fathoms water between them. From thence the reef extends to the SE. for 3 miles, with its outer edge 12 miles from the shore, and 9 fathoms water a mile outside it. It is somewhat circular, and from 2½ to 3 miles in diameter. In the center the coral uncovers. Timbebas reef, being so far off the coast, is the most dangerous of the group, as, when at one or 2 miles from it, the land appears as a uniform line with nothing to mark it. The center of the reef is 12 miles N. 68° E. (N. 78° E. mag.) of the village of Alcobaça.

The lead is of little use in approaching this bank, as the depths are nearly the same within the limits of 2 and 8 miles from it. There are, however, some patches of coral, with 5½ and 6½ fathoms water on them, at 4 miles distant. When the winds are fresh from the offing the current sets strong to west or SW.

Directions.—Vessels bound to Prado from the east or NE. should avoid Timbebas reef by making the Barreiras do Prado in about latitude 17° 15′, and if the weather is clear mount Pascoal will be seen at over 30 miles from the coast. The cliffs will be seen to rise gradually at a distance of 15 miles. A little after the coast to the southward appears as a line of trees; the first group seen will be the large trees on the south side of the entrance to the rio Jucurussu. When near, this group appears but little higher than the others, but seen from a distance is more marked.

When the village and white church of Prado are seen, steer so as to pass north or south of Prado reef (northward is preferable), and anchor in about 4 fathoms, sand and mud, at one mile from the bar, with the village to the NW., distant 2 miles. This anchorage is partly sheltered from the sea by Prado and Guaratibas reefs. The flood tide sets to the southward and the ebb to the northward. The currents in the offing depend much on the direction and force of the winds.

Coast.—The coast from the town of Prado, trends to the southward for about 4½ miles, to the low point of Guaratibas, then for 8 miles farther to the bar of Alcobaça, where it trends to the southeastward for 8½ miles to Baleine point. On all this extent it has the same aspect, and is visible at a distance of about 12 miles. The low beach is crowned with a line of uniform vegetation, and some trees a little higher than others serve as marks, of which the three following are the most conspicuous:

The large group of trees at Prado appears above the horizon at 13 or 14 miles distant, but their height apears to diminish as the coast is approached. They are of great utility when navigating near Timbebas reef. The Fincudo, a large round tree, near the shore, at 2 miles south of the bar of Alcobaça, for which place it serves as a mark, is seen first in the horizon above the low coast.

The tree of Caravellas, on the most elevated land near the shore, 3½ miles SW. of Baleine point, serves to guide vessels when outside Caravellas bank. It is of great use to the fishermen.

Alcobaça.—The little village of Alcobaça stands between the shore and the left bank of the rio Itanhem. When seen from the offing it appears larger than Prado. There is less commerce here than at Prado, although the river is easier of access and can be entered during fine weather and favorable tide by coasters of 6 feet draft. Pilots are always to be obtained.

The rio Itanhem runs from the chain of the Aimores, and is navigable for some miles. At about a mile to the NNE. of the village is a small patch of rocks, but its exact position is doubtful. From the bar of Alcobaça the coast, forming a bay to the southward, is bordered by an extensive sandbank with 1½ fathoms at 4 miles from the shore. At 3 miles southward of Fincudo tree is the Barra Velha, a little river, with a fishing village.

Baleine point is low, woody, the most salient on all this part of the coast, and forms the north point of entrance to the rio das Caravellas. On its extremity are two houses, with red roofs and a mast, rising from the midst of the verdure, visible from the offing. An extensive sandbank fronts the point for the distance of 4 miles, partly dry at low water, leaving between it and the shore the northern channel to Caravellas, carrying 14 feet at high water.

Parcel das Paredes are extensive banks and reefs lying off Baleine point and northwestward of the Abrolhos islets, bordering the coast for a distance of 25 miles; large portions of the reefs are awash or above water, and are so steep-to as to have acquired the name of Paredes, or walls. The northern part of the outer edge of the main group is distant 11 miles eastward of Baleine point, and its southern point is 18 miles from the shore, extending over a space, north and south, of 14 miles. Isolated reefs extend in a NW. direction for 6½ miles from Lixa reef, the NW. point of the main group terminating in Arca reef, which dries in sandy patches at low water. Between Lixa and Aranguera reefs is the Boquerão channel; between Aranguera and Cabocolas reefs is the Tainhas channel, in which are several isolated patches, and northward of Arca reef is Itanhem channel.

Sebastião Gomez and Coroa Vermelha reefs.—At 7 miles westward of the south edge of the main group is the NE. reef of the southern cluster, named Sebastião Gomez, about one mile in extent, which uncovers at a low tide, and at about 5 miles northward of which are two isolated patches. The channel between carries from 5 to 11 fathoms water. At 5½ miles SW. of Sebastião Gomez is the Coroa Vermelha, an islet of reddish sand, 3 feet above water, and about ¼ mile in diameter. The islet has some small trees or brushwood on it, and is seen 6 or 7 miles. A reef of coral extends 2 miles north of the islet and uncovers. There is a passage between this reef and that of Sebastião having from 6 to 9 fathoms water.

The depths are reported to have decreased considerably between Coroa Vermelha and the 2¼-fathoms patch westward of it.

Viçosa reef.—At 3 miles southwestward from the islet and 7 miles from the mouth of the rio Perohipe is the SW. part of the group, named the Viçosa reef, which uncovers at low water, and is about 4 miles in length in a NW. and SE. direction. At 14 miles S. 77° E. (S. 67° E. mag.) of the Coroa Vermelha, 16 miles S. 76° W. (S. 86° W. mag.), of the Abrolhos lighthouse, and on the meridian of the center of the main group of the Paredes, lies a shoal on which the sea breaks, named Poppa Verde, with 2¾ fathoms. Within and between the reefs there are navigable channels for small coasters.

Itanhem and Southeast channels.—Directions.—Between Arca and Timbelas reefs, a distance of 7 miles, is the Itanhem channel, with depths of 7½ to 12 fathoms. The bottom consists of mud, and extends from 8 to 10 miles eastward, serving to indicate the approach to this channel on the parallel of Alcobaça. This channel, much used by coasting craft, leads to the passage between Parcel das Paredes and the sandbanks off Caravellas, thence to the southward by Southeast channel or the passage between the southern reefs and the shore. Westward of the Paredes the water shoals gradually towards the sandbanks off Caravellas, and vessels may safely navigate the channel in 5½ and 6½ fathoms until abreast the conspicuous cocoanut trees of Felix, southward of Caravellas, when the position may be ascertained by bearings, and the course directed accordingly. In the northern portion of the channel depths of 8 and 9 fathoms indicate the approach to the steep edge of the Paredes. The Southeast channel is the best route to Caravellas from the southward.

The Abrolhos, or islets of Santa Barbara, distant 30 miles SE. of Baleine point, are five in number, exclusive of rocks, the whole occupying a space of about 1¼ miles. Santa Barbara, the largest islet (about 130 feet high), is ¾ mile in length, east and west, by 200 yards in breadth, with a lighthouse near the eastern extremity. The other islets are Redonda, Siriba, Southeast, and Guarita. The only vegetation on them are rushes, cactus, and wild purslane. Innumerable birds dwell on these islets and cover them with their nests and eggs. Turtle at times have been found.

Sea salt crystallized is found in several places, and a small quantity of fresh water filters through the rocks at the north point of Santa Barbara islet. This islet is free from danger, with the exception of the west end, where a reef extends to the NW. for a distance of about 300 yards. The three smaller islets to the southwestward are each bordered with reefs, which extend off about 300 yards. The two westernmost islets are connected by a reef, and there is a narrow channel having 2¼ fathoms water between them and Santa Barbara.

At the distance of 1,300 yards eastward of Southeast islet is the western edge of a bank, 600 yards in breadth, having only 20 feet water over it, and about 400 yards northward of this bank are several patches of 19 feet. With these exceptions the water between the islets is deep, and a vessel may, if necessary, pass at a distance of ⅛ mile on either side, or between them. About one mile eastward of the islets are shallow patches on the edge of Parcel das Abrolhos.

Parcel das Abrolhos is a coral bank, with an average depth of about 10 fathoms, with shoal spots of 3 to 10 feet, and rocks which uncover towards the center. It is 9 miles in length in a north and south direction, and 2 miles in breadth, with its eastern edge 4 miles from the lighthouse. A vessel having the sun astern may cross the bank guided entirely by the eye in avoiding the coral patches, but in calm weather, or with the sun ahead, these shoals can not be discerned in time to clear them. At about a mile from the SW. edge of the bank is a shoal spot with 5½ fathoms water on it. Between this shoal and the bank there are depths of 14 fathoms, and at 2 miles from the eastern edge of the bank, or 6 miles eastward of the meridian of the lighthouse, there are from 12 to 18 fathoms water. Vessels are recommended to give the bank a good berth, as it is steep-to.

In the vicinity of these rocks fishing is carried on by the inhabitants of the neighboring coast. Those of Porto Seguro send about 50 vessels every year during the northern monsoon; they take cargoes of fish (groupas), which when dried form the ordinary food of the people. The vessels generally remain out six weeks.

Light.—On the eastern part of Santa Barbara is an iron circular tower 51 feet high, which exhibits at the height of 167 feet above high water a *revolving* white light *every minute*, showing flash of eleven seconds, and should be seen in clear weather from a distance of 18 miles. (It has been seen 20 miles.) Within 7 miles a faint continuous light is seen; westward of the light a small sector is obscured by Redonda islet when within 3 miles. Reported irregular.

Anchorage.—There is anchorage with northerly winds in 9 fathoms, sand and shell, about midway between Santa Barbara and Southeast islets, with the lighthouse bearing N. 42° E. (N. 52° E. mag.) distant ½ mile; and with southerly winds, to the northward of Santa Barbara, in 8 fathoms, fine sand and shell, with the lighthouse S. 42° E. (S. 32° E. mag.) distant rather more than ½ mile, and about ¼ mile from the shore. A vessel may pass on either side of Southeast islet and eastward of Santa Barbara at the distance of ¼ mile, in from 8 to 10 fathoms water.

Tides.—It is high water, full and change, at the Abrolhos rocks, at about 3h. 20m.; and the rise is from 6½ to 7 feet. The tides are tolerably regular, but influenced by the strength and direction of the wind. The current runs from one to 1½ miles an hour; in the narrow channels of the Paredes it attains 3 miles an hour and follows the direction of the channels, though much influenced by the force and direction of the winds.

Abrolhos channel is bounded on the east by the rocks and banks of the same name, and on the west by the extensive banks and reefs of the Parcel das Paredes. The channel is 10 miles wide, and may be taken in clear weather, for, with the exception of Banco Marajo and La France shoals, and two spots having 6 and 7 fathoms, the general depths are from 9 to 13 fathoms. As the banks are, however, steep-to, little or no dependence can be placed on the lead, yet, as a rule, the depth of water rather increases on approaching the reefs, when a white chalky mud will be found.

Shoals.—Banco Marajo shoal, composed of coral, and having a depth of 2 fathoms at low water, of irregular shape, and about one square mile in extent, lies with Abrolhos Rocks lighthouse bearing S. 10° E. (south mag.) distant 13 miles.

Two shoals, composed of coral, and having each a depth of 6 fathoms at low water, lie with Abrolhos Rocks lighthouse bearing S. 10° E. (south mag.) distant 10½ miles, and S. 24° E. (S. 14° E. mag.) distant 4 miles, respectively.

A shoal, composed of coral, and having a depth of one fathom at low water, lies with Abrolhos Rocks lighthouse bearing S. 20° W. (S. 30° W. mag.) distant $1\frac{4}{10}$ miles nearly.

Two shoals, composed of coral, and having each a depth of 2½ fathoms at low water, lie with Abrolhos Rocks lighthouse bearing S. 10° W. (S. 20° W. mag.) distance 1¼ miles, and S. 4° W. (S. 14° W. mag.) distant ¾ mile, respectively.

La France shoal, on which *La France* touched, is stated to lie with Abrolhos lighthouse bearing S. 11° E. (S. 1° E. mag.) distant 6 miles. The positions assigned to these shoals are approximate.

California shoal, on which the ship *California* is reported to have struck (1891), has on it a depth of 4 fathoms, and is said to lie with Abrolhos Rocks lighthouse bearing N. 38° W. (N. 28° W. mag.) distant 11¾ miles.

Directions.—Intending to pass through the Abrolhos channel from the northward, the islets should not be approached nearer than 13 miles without ascertaining the vessel's position. But with the light in sight about 15 miles distant, bring it to bear S. 21° E. (S. 11° E. mag.) and steer for it, which course will lead (probably) about 2 miles westward of Banco Marajo shoal. When at the distance of about 9 miles from the light, steer S. 2° W. (S. 12° W. mag.) in 10 to 12 fathoms water, which will lead about 2 miles westward of La France shoal and about 4 miles westward of the light, and clear of all dangers.

From the southward, keep the light on a N. 36° E. (N. 46° E. mag.) bearing, and when at the distance of 6 or 7 miles from it steer N. 10° W. (north mag.) which will lead about 4 miles westward of Abrolhos lighthouse, and through the Abrolhos channel clear of all known dangers.

Caution.—As there are banks of 6 fathoms, named Calladas shoals, NNE. 16 to 23 miles distant from Abrolhos lighthouse; caution should be exercised when navigating in their vicinity, as less water may exist.

Outlying banks.—There are several outlying banks off this part of the coast of Brazil. The south end of the northernmost, Fly bank, is on the parallel of 16° 53′ S. and in longitude 16° 13′ W., from thence it extends to the northward for about 6 miles, having a breadth of about 2 miles, with 31 and 32 fathoms water over it. The assigned position of this bank was crossed by H. M. S. *Sylvia* in 1882, but no bottom was obtained with 65 fathoms of line.

Rodgers bank has a general depth of 30 fathoms. The bank is 15 miles long in a NE. by N. and SW. by S. direction, and 10 miles broad. The center of the bank is in latitude 17° 7′ S., longitude 36° 54′ W.

The least water found was 24 fathoms, on the northeastern edge. The east, west, and NW. sides are steep-to, the soundings deepening suddenly to no bottom with 100 fathoms of line. The bottom is composed of coral intermixed occasionally with moss and weed.

Sulphur bank.—The French Government vessel *Minervé*, passed over this bank in October, 1883, obtaining soundings over a distance of 4 miles in a N. by W. direction the least depth obtained was 26 fathoms, coral, in latitude 17° 2′ 50″ S., longitude 37° 34′ W. This position is 4 miles to the westward of the position assigned to Sulphur bank on the charts, and on which is the depth of 29 fathoms.

Hotspur bank.—This bank was partially examined in 1852 by H. M. S. *Herald*, when depths of 25 to 30 fathoms, coral, were obtained. The *Herald* anchored near the NW. edge of the bank; with the wind at NE., and moderate weather, no current could be detected, and there was no discoloration nor rippling of the water.

An examination of Hotspur bank by Commander Rodgers, 1877, has shown that the bank is more extensive than was formerly supposed, its length being 22 miles east and west, and its breadth 12 miles, the depths obtained varying from 32 to 48 fathoms, coral, with a general depth of 33 fathoms. From the edge of the bank the soundings increase suddenly to no bottom with 100 fathoms of line. The NW. extreme of the bank is in latitude 17° 50′ S., longitude 36° 7′ W.

Busbridge bank.—A coral patch of 30 fathoms (Busbridge, 1792) lies south, about 35 miles from Hotspur bank, in latitude 18° 36′ S., longitude 35° 59′ W.

Hogarth bank.—Mr. T. Eddes, commanding the steamer *Hogarth* (1888), reports soundings of 13 fathoms, coral, at 38 miles southward of Abrolhos Rocks lighthouse. The weather was clear, with smooth water at the time, and the bottom, of coral, was plainly seen, the vessel being stopped to adjust machinery. Position by reliable observations, latitude 18° 30′ S., longitude 38° 21′ W.

Zime bank.—Mr. D. Lloyd, commanding the barque *Zime*, reports that about 40 miles southeastward of Abrolhos rocks, soundings of 12 to 14 fathoms were obtained. The water was discolored, and the shoal ground was estimated to be 2 or 3 miles in extent. A depth of 37 fathoms was suddenly found in one spot. Position as given, latitude 18° 33′ S., longitude 38° 10′ W.

This position is about 10 miles eastward of the 13 fathoms recently reported from the steamer *Hogarth*, and may be a part of the same shallow bank.

Unanima bank.—Capt. Korf, of the bark *Unanima* (1891), reports having obtained soundings of 14½ fathoms in latitude 18° 32′ S., longitude 38° 23′ W., for a distance of 2 miles in an east direction, thence deepening to 15, 23, and 30 fathoms, no bottom.

Montague bank.—A bank with 36 fathoms (Montague, 1813) was reported in latitude 20° 18′ S., longitude 36° 20′ W., and 16 miles N. 60° W. (N. 50° W. mag.) of this position, a depth of 58 fathoms.

In 1882 the French vessel of war *L'Eclaireur* obtained 34 fathoms on the Montague bank.

Jaseur bank.—A bank in latitude 20° 34′ S., longitude 35° 43′ W., with a depth of 32 fathoms sand and coral, was found by H. M. S. *Jaseur*, in 1825; H. M. S. *Nassau* (1866) found 30 fathoms; and H. M. S. *Dwarf*, 1881, obtained 27 fathoms. This bank is the *Belle Poule* of the French.

Sylvia bank.—On this bank, in latitude 20° 3′ S., longitude 37° 33′ W., the least depth obtained was 43 fathoms, coral. This bank is the *L'Eclaireur* of the French.

Champlain bank.—The commander of the *Champlain* has reported having obtained a sounding of 42 fathoms in latitude 20° 4′ S., longitude 37° 32′ W., near the southern end of Sylvia bank. Also a sounding of 20 fathoms in latitude 20° 24′ S., longitude 37° 42′ W., or about midway between Sylvia and Victoria banks.

Victoria bank lies between the meridians 37° 3′ and 38° 30′ W., and the parallels of 20° 30′ and 20° 57′ S., having from 40 to 19 fathoms water, coral bottom; this latter depth is near the NE. part of the bank, in longitude 37° 24′ W., and close to the north of it the depth is more than 100 fathoms.

Congress bank, a patch with 35 fathoms, lies about 4 miles WNW. of the 19-fathom patch on Victoria bank.

Reported islet.—Capt. Herbert, of the ship *Lion*, reports having passed within ½ mile of an islet of yellow sand about 5 feet high and 33 yards in diameter, lying about 82 miles eastward of Espirito Santo bay. Position given to be considered doubtful; latitude 20° 21′ S. and longitude 38° 46′ W. (1892). Unsuccessfully searched for by the Brazilian cruiser *Parnahiba* (1893).

Pilot bank lies in a NE. and SW. direction, between the parallels of 21° 40′ and 20° 53′ S., with its SW. end about 60 miles from cape St. Thomé. This bank has from 9 to 35 fathoms water over it, with upwards of 75 fathoms outside it, and a depth of 203 fathoms between it and the bank surrounding cape St. Thomé. All these banks have a hard coralline crust and are steep-to.

Caution.—Owing to the broken character of the bottom shown by existing surroundings, and to the imperfect nature of the surveys, it is probable that many shallow patches exist in the area for more than 200 miles around the Abrolhos rocks, though it is at the same time likely that any dangers would have by this time been seen.

River Caravellas.—The mouth of this river, fronted by sandbanks and reefs, which extend off 4 miles, is about 25 miles southward of the town of Prado. It is about ½ mile wide, with village on the north side of entrance. At about 7 miles from the entrance one branch of the river trends to the SW. and communicates with the Perohipe near Villa Viçosa. The town of Caravellas stands on rising ground on the north side of the river, 5 miles from the entrance, and carries on a large trade in farina and coffee, which are extensively cultivated in the district. The population is about 1,000.

Bar.—Channels.—There are four channels through the sandbanks which front the river, two of which only are used by ocean vessels, named the NE. and SE. channels. Both of these, and also the Alagados (a branch of the SE. channel) are kept well marked by stakes, and are sufficiently wide, with a tolerably direct course, to render navigation easy. From the entrances to the deep water in the river the distance is 4 miles.*

Harbor.—Inside the bar is a fine harbor, more than ½ mile wide, and 6 miles long from the mouth of the river to the upper part of the town of Caravellas, with from 23 to 33 feet, and in places deeper. The terminal station of the Bahia and Minas railway is established on the left bank, 2 miles below the town, off which there is roomy anchorage in 6 fathoms at low water.

---

*It is reported that the south bar of the rio Caravellas no longer exists. It is entirely closed at low water spring tides, and only affords passage for small craft during high water (1889).

Tug.—There is a steam tug for the purpose of towing vessels in and out over the bar, under an experienced pilot.

Tides.—It is high water, full and change, at Caravellas, at 4h. 15m.; spring rise about 10 feet. The tidal stream varies from 2 to 3 knots; the flood sets to the south and the ebb to the north, outside the bar; but this direction varies very much with the locality, and force and direction of the wind.

Coast.—From the mouth of the Caravellas the low shore trends in a southwesterly direction for 14 miles to the little river Perohipe, where on the north bank stands Villa Viçosa, 4½ miles from the bar.* From the mouth of the Perohipe the coast continues to the SW. for 15 miles to the bar of the rio Mucury and village of San José de Porto Alegre. The rio Mucury is navigable for about 50 miles from its mouth. The coast then trends SW. for 8 miles, and thence to the southward for 24 miles to the mouth of the rio San Mateo. All this coast is level, and presents a uniform line of vegetation. The Barreiras Velha, 10 miles southward of the Mucury, are reddish cliffs about 100 feet high, and remarkable by their isolation.

Lençol point, at 2 miles southward of the cliffs, is so named from some peculiar white spots seen a few miles from the offing, and which have the appearance of groups of houses. From Lençol point to rio Doce, 78 miles farther south, the land is a low sandy plain, with scanty vegetation; in many places the coast is composed of yellow sandhills separating the sea from the marshes and lagoons, and which extend to the foot of the mountains at 25 or 30 miles in the interior. At 2½ miles south of San Mateo are some large white sand downs. This latter part of the coast is visible at a distance of 8 or 10 miles and is clear of danger.

From rio Doce the coast trends to the SW. and changes its aspect; it becomes more elevated and frequently interspersed with small red cliffs, bordered by a few reefs which extend off about a mile. The high mountains of the Aimores rise from the lowland in the interior, and from the SW. is seen mount Mestre Alvaro. Between rio Doce and Espirito Santo bay, the Sahi, Santa Cruz, Preto, Reis Magos, and Carahipe rivers enter the sea, the latter on the parallel of mount Mestre Alvaro.

Rivers.—A small island with a village on it forms the northern side of the entrance to San Mateo; inside it are the mouths of four different streams. The entrance is dangerous, with breakers on either side, and has 6 feet at high water ordinary tides and 9 feet at springs. The town of San Mateo is 12 miles from the entrance. At some distance in the interior and a little southward of the bar there are three small downs, the middle one being the highest; when seen from the eastward they appear as one.

---

* Reported (1889) to have extended 3 miles eastward.

The bar of the rio Seca is about 32 miles southward of San Mateo, and forms a small opening between the trees. The bar of the rio Doce lies 30 miles southward of the rio Seca, and carries 13 feet at high water springs and 9 feet at neaps; it appears like a large open space between the trees with which the coast is covered. Inside the bar is a spacious basin. A bank of red sand extends from each point, the breakers reaching out 3 miles; the entrance is partly obstructed by a bank above water. The north point of entrance extends out a little farther than the other and has a large house on it.

The bar of the rio Reis Magos, southward of the Doce, has 7½ feet at high water springs, but is dangerous.

Mestre Alvaro mount is situated about 11 miles northward of Espirito Santo bay; its height (3,215 feet), form, and isolated position render it equally remarkable; it is nearly the northern termination of the highlands to the southward, and leaves no doubt when in sight as to a vessel's position.

Carápebu shoal is situated about 2 miles from the shore and 5 miles northeastward of Tubarão point, entrance to Santo Espirito bay.

Espirito Santo bay.—The entrance to this bay is 2 miles wide between Tubarão point on the NE. and Sta. Luzia point on the SW. The bay is about 2 miles deep, and in the southern part, in front of the mouth of the rio Santa Maria, are two islands with several small islets or rocks.

Mount Moreno.—The base of this mount forms the south point of entrance to the bay and river of Espirito. The mount is conical, partly wooded, 689 feet high, and may be seen in clear weather from a distance of 30 miles. At ½ mile S. 73° W. (S. 82° W. mag.) is the morro of Nossa Senhora da Penha, a rocky hill, with a convent on its summit.

Dangers.—From Tubarão point, which is low and wooded, a reef of rocks extends to the SE. for ½ mile, with 6 fathoms water at 250 yards southward of them. The north and west parts of the bay are shoal, and the water breaks with SE. winds.

At the distance of 300 yards NE. of Tarano point is Balea rock, uncovered, with sunken rocks around it; and at about ½ mile eastward of the point is Cavallo reef.

A pinnacle rock (locally known as Baixo Pequeno, little shoal), with 12 feet over it at low water, lies in the approach to port Victoria, with (approximately) Santa Luzia Point lighthouse bearing S. 25° W. (S. 34° W. mag.), distant 1,700 yards, and Boi Island summit S. 87° W. (N. 84° W. mag.).

A dangerous sunken reef lies in the fairway of the entrance to the river, with the inner part of Tubarão point bearing N. 14° E. (N. 23° E. mag.) and Tarano point S. 77° W. (S. 86° W. mag.). The convent of La Penha well open northward of mount Moreno bearing S. 62° W. (S. 71° W. mag.) leads 200 yards northward of the reef; and Frade Léopardo (Needle) hill just open to the southward of the western hill on Boi island, touches the south edge of the reef. There is a depth of 9 fathoms close eastward of the reef, and with a smooth sea it is seldom seen, but with strong breezes blowing into the bay the sea breaks on it.

Bar.—A depth of 17 feet will be found on the bar of Santa Maria river at high water springs, and 15 feet at high water neaps.

Light.—On the hill of Santa Luzia, on the south side of Espirito Santo bay, is a lighthouse which exhibits, at an elevation of 75 feet above high water, a *fixed* white light visible in clear weather from a distance of 12 miles.

Victoria.—The town of Victoria, capital of the province of Espirito Santo, stands on the north side of the river about 3 miles west of mount Moreno, and less than ½ mile westward of a remarkable conical hill, named Sugarloaf peak, 446 feet high, on the south side of the river. It is partly in ruins, and may contain between 4,000 and 5,000 inhabitants; the population of the province of Victoria is about 65,000. The climate here is humid, caused by the height of the surrounding hills. There is little foreign trade at this port.

The United States is represented by a consular agent.

Supplies.—Beef of inferior quality may be obtained; vegetables are scarce but good. Coal is dear.

Water may be had by sending canoes a short distance up the rivers.

There is fortnightly communication with Rio de Janeiro.

There are no regular pilots, but masters of coasting craft undertake the service.

Buoys.—Two buoys mark the best channel over the bar; the deepest water is to the northward of them; but little dependence can be placed on their being maintained in position.

Beacons.—A beacon marks the edge of the shoal water in Villa Velha bay, and another is moored off St. João battery near the town. There is a rock with 9 feet of water on it, about 50 feet southeastward of the latter beacon. A rock with about 2½ fathoms on it at low water lies in the anchorage off Victoria, with (approximately) the beacon off St. João battery bearing N. 73° E. (N. 82° E. mag.) distant 650 yards, and College church spire N. 48° W. (N. 39° W. mag.).

Anchorage.—Large vessels should anchor in the bay with the college at Victoria in line with Moreno point, in 11 to 13 fathoms, muddy bottom, one mile from the outer sunken reef.

Tides.—It is high water, full and change, at Espirito Santo about 3h., and the spring rise is 4 feet, but the tides are not regular. The tide makes strong at the entrance, especially near Balea rocks.

Directions.—From the anchorage in the bay, steer in north of the outer reef, with Frade Léopardo in line with the north side of Boi island, bearing N. 82° W. (N. 73° W. mag.). When the battery on the point under the convent of N. S. de Penha opens north of Balea rock, steer with it a little on the port bow, and pass about 200 yards north of the Balea in 6 fathoms water. To steer in south of the outer reef, bring Frade Léopardo well open southward of the western hill on Boi island, and steer in until the battery is open north of the Balea, then proceed as before.

There is a narrow channel between Balea rock and Tarano point having 13 feet water, and is often used by the pilots. Having passed Balea rock, the route is along the south shore; the depth over the bar will decrease to about 13 feet low water, increase to 16 feet off the battery, and deepen within.

Thence steer north of Pombas islet in the middle of the river, in 5 to 11 fathoms; after passing it, keep close along by the shore of Sugarloaf peak (Pão de Açucar) in 6 to 9 fathoms, to avoid the shoal water SE. of St. João beacon; from thence the water shoals to about 3¼ fathoms, deepening again to 3¾ and 4½ at the anchorage off the town.

The aspect of the coast between Espirito Santo and Rio de Janeiro is that of a series of high mountains, which at first appear isolated, or united in groups, beginning at the rio Parahiba near Campos, and forming the great chain extending to the southwestward, and known by the names of serra do Imbè, Macahé, and Orgaos. These mountains are remarkable by their broken pyramidical peaks, such as the frades de Espirito Santo, Itabapuana, the serra do Pico, the Frade de Macahé, and the pipes of the organs of Rio de Janeiro. Their summits vary from about 4,000 to 6,000 feet in height, and may be seen at a distance of 60 to 75 miles; but situated 30 miles in the interior, and the land often covered with a fog or haze, they are not of much use to the mariner for landmarks; it is generally at sunrise when they are seen farthest. The large boggy plains which extend from their base to the coast form the low land of cape St. Thomé, which is often blended with the sea, and visible only at about 4 or 5 miles.

Coast.—Guarapari islets.—At 1⅔ miles southeastward of mount Moreno are the Pacotes rocks, above water; and at about 6½ miles to the SW. of the Pacotes is cape Jicu. Between, the coast is bordered by several patches of rock at the distance of more than a mile. At about 13 miles southward of cape Jicu, and extending about 3 miles off Pero Cão point, is a group of five or six small islets, named Guarapari, with 7 fathoms water close to them; the two largest islets are 2½ miles from the coast, and are visible 10 or 11 miles. Between these islets and the coast there is a passage for small vessels. At about 4 and 5 miles farther south are two other islets at 5 miles from the coast, and nearly on the parallel of the mouth of the rio Guarapari. The northern, named Raza, is a flat rock about 10 feet above the water, and divided into two parts; the southern is a round sandy islet, 18 or 20 feet high, named Escalvada. From Pero Cão point the coast trends about WSW., a distance of 5 miles to the mouth of the Guarapari, thence the coast, composed alternately of small beaches and red cliffs, trends southwestward for 12 miles to Benevente point.

Vessels may pass within the Raza and Escalvada islets in depths of from 18 to 11 fathoms. The coast here is of moderate height, almost covered with small trees, and having in places low yellowish cliffs which are not to be found southward of Benevente point. In the interior of the country are several groups of remarkable mountains, conical, upright, and inclined, which give to this part of the coast an appearance different from that north or south of it.

Rio Guarapari.—The entrance to this river, having 19½ feet water at high water springs, and 18 feet at neaps, is about 30 yards wide, lies N. 74° W. (N. 65° W. mag.) 6 miles from Escalvada isle, and enters the sea between two small woody hills. The south point of entrance is 50 or 60 feet high, and has a church, several houses, and a tall palm tree on it, being the only one in the vicinity of the river; southward of it are some low, red cliffs. Vessels of nearly 19 feet draft can enter this river at high water springs, as there is no surf, and lie moored head and stern in 5 or 6 fathoms water. There is a sandbank a short distance inside the bar; avoiding this, the water is deep for about a mile up. The village is just within the entrance on the right bank.

Anchorage.—There is anchorage in the bay in 7 or 8 fathoms water, sheltered from NE. (through north) and SW. winds.

Benevente bay.—From Benevente point, the low shore forming Benevente bay, trends to the NE. and thence westward for about 2½ miles to the entrance of the river and town of the same name. From the point, a dangerous reef extends to the SW. for 1½ miles; the outer part of it forms two detached shoals about ½ mile in extent, NW. and SE., leaving a space of nearly ½ mile in breadth, having 4½ to 6 fathoms water, between them and the inner part of the reef, the greater part of which uncovers at low water springs.

The Baixo Grande, the southernmost of these outer shoals having 3 to 5 feet over it at low water, and 5 or 6 fathoms close to (southern shoal), lies with Benevente church bearing N. 3° W. (N. 6° E. mag.), and Benevente point N. 33° E. (N. 42° E. mag.), nearly 1½ miles. At 600 yards NW. of Baixo Grande is Cormorant shoal, a coralline patch of 2½ fathoms, about 200 yards in extent, and 5 and 6 fathoms round it.

The town of Benevente stands on the east point of entrance to the river, the mouth of which, about 300 yards wide, is easy of access; the bar has 9 feet over it at springs, 6 at neaps, and only breaks with strong southerly winds. Within the river the depths are 1½ and 2 fathoms. Stock of all kinds at moderate prices may be procured.

Anchorage.—A good berth will be found in 4½ fathoms, mud and sand; with Benevente church bearing N. 9° E. (N. 18° E., mag.), and the point S. 80° E. (S. 71° E., mag.).

Tides.—It is high water, full and change, at Benevente at 3 h.; and the rise of the tide is 5 feet.

Directions.—Coming from the northward, Francesa Islet lighthouse may be steered for when bearing S. 72° W. (S. 81° W. mag.), which will lead about ½ mile south of Baixo Grande, or the south Piuma islet bearing N. 69° W. (N. 60° W. mag.) will also lead to the southward of the shoals. When Benevente church, which is whitewashed and stands a little above the town, bears N. 10° E. (N. 19° E. mag.), steer for it, and a vessel will pass to the westward of the shoals in 7 to 5 fathoms water to the anchorage.

Piuma.—A small town standing on the south point of entrance to the river of the same name, about 4 miles SW. of Benevente. Boats only can enter the river; but there is a well sheltered anchorage outside for coasting vessels, formed by three islets close together, lying nearly north and south. The water in the river is good, and may be easily procured in fine weather by anchoring in 4 fathoms about one mile from the South Piuma islet, or farther out for a vessel of large draft.

Francesa islet.—About ½ mile in extent, is situated about 7 miles southwestward of Benevente point, and is connected with the shore about one mile distant, by a ridge with depths of one to 2 fathoms.

A reef extends in a NE. direction from the islet a distance of ½ mile, with 6 fathoms close to.

Between the islet and Piuma, abreast mount Agha, 820 feet high, a patch of rocks extends about ½ mile off shore, and are partly uncovered.

Light.—On the highest part of Francesa islet, from a quadrangular stone lighthouse 38 feet high, is exhibited, at an elevation of 156 feet above the sea, a *fixed* white light, visible in clear weather from a distance of 14 miles.

Anchorage.—There is anchorage in 5 fathoms, in the bight northward of Francesa islet, with the lighthouse bearing about S. 21° W. (S. 30° W. mag.), distance one mile.

Itapemirim.—A town standing on the south side of the river of the same name about 1½ miles from its entrance, at about 11 miles SW. of Benevente. The bar of the river has 9 feet on it at high water springs, and 6 feet at neaps; but it is dangerous for boats after strong northerly winds. There are three islets off the mouth of the river, the outer two named White, or Moscas, islet and Egg islet, have depths of 4 to 6 fathoms between them, but no vessel should use this passage unless in case of necessity. There is anchorage in 7 fathoms water, mud bottom, with Francesa islet bearing N. 32° E. (N. 41° E. mag.), and the entrance to the river S. 38° W. (S. 47° W. mag.).

White, or Moscas, islet, about a mile from the shore, is about 100 yards in length, with a rock about the same distance from its NE. end, and a reef extending 200 yards from its SW. end, having 6 and 5 fathoms water close to the breakers at its SW. edge. At 3¾ miles S. 86° E. (S. 77° E. mag.) from White islet, is a bank about 200 yards in diameter, with 4¾ fathoms water on it.

Coast.—Barreiras de Siry.—At about 3½ miles southward of White islet, on the summit of a hill, is a remarkable tree. Between latitude 21° 9′ and 21° 12′ are four large red cliffs, separated by narrow valleys, in one of which is the village of Villa Nova. These cliffs, named Barreiras de Siry, form one of the best marks for this part of the coast. Swallow islet lies about 200 yards from the middle cliff. The coast southward is a low woody plain to within a mile of Itabapuana, at 7 miles farther on.

Banks.—At about 4 miles eastward of these cliffs, a 3¼-fathom bank is marked on the chart, but its position is doubtful. Beyond the Itabapuana are some low red cliffs, the southernmost on this coast. Retiro, or Castellanos, point at 3 miles southward of Itabapuana is surrounded by reefs extending a mile off, and on which the sea breaks.

From the parallel of Benevente to that of Santa Anna islets, in about 22° 25′ S., the coast is backed at from 20 to 25 miles in the interior by a remarkable chain of mountains, leaving between a low extensive plain. Mount Campos, 4,592 feet in height, in about latitude 21° 34′ S., is a remarkable sugarloaf peak, and when on a N. 85° W. (N. 77° W. mag.) bearing leads to the mouth of the Parahiba do Sul.

Rio Itabapuana.—The entrance to this river is northward of Retiro, or Castellanos, point and the southern small red cliffs, and will be known by several large white houses on the beach. The bar has 10½ feet on it at high water springs, and is dangerous with NE. winds. There is anchorage in the river abreast of the village which is on the right bank, in about 4 fathoms.

Itabapuana reefs extend off the shore in an easterly direction from the bar, to a distance of 2 miles. The outer and largest is 400 yards in diameter, and generally breaks; the other two patches are nearer the shore. Southward of the reefs, about one mile from the shore, there is a depth of 4 fathoms. There is a channel for small craft southward of the reefs and northward of Castellanos Point reefs, but local knowledge is necessary.

To the NE. of the reefs the soundings increase gradually. When standing in for the town during southerly winds, a vessel should pass northward of the reef. Anchor with the NW. breakers bearing S., 18° E. (S. 10° E. mag.). With northerly winds a vessel should anchor southward of the reefs, with the bar bearing N. 52° W. (N. 44° W. mag.), and distant one mile from the shore. The anchorage is indifferent.

Rio Parahiba do Sul.—From Retiro point the coast forms an indentation to the mouth of the Parahiba do Sul, forming the bay of Sacco do Gargau, which affords anchorage from winds between SW. and SE., and is much frequented by coasters. A branch of the Parahiba enters the bay, and affords communication with the town of São João. The Parahiba do Sul has its source in the eastern part of the province of São Paulo, and after a tortuous course of more than 500 miles, it enters the sea at the village of São João da Barra.* The river is much obstructed by sandbanks down to its mouth, which is named Barra da Campos, and where there is a depth of about 8 feet at high water springs, but it is dangerous after heavy rains or fresh breezes.

---

* São João da Barra must not be confounded with Barra de São João, between capes St. Thomé and Frio; there are no less than 39 localities named São João on the coast of Brazil.

The land here is low and difficult to distinguish. The Barra da Campos will be known from the SE. by a high circular hill with a remarkable mound on its top. On the sand near the mouth of the river is a flagstaff, on which a flag is hoisted when it is practicable to cross the bar in a trading vessel, but which it is difficult to distinguish from the vessel's masts inside, when to the southward; from the north it is very conspicuous, as also the sand where it is erected.

The most convenient anchorage off the bar will be found with the flagstaff bearing between S. 16° W. (S. 24° W. mag.), and S. 38° W. (S. 46° W. mag.). Coasting vessels anchor here when obliged to wait for wind and tide to cross the bar. There is a depth of 5 fathoms, good holding ground, at one mile from the shore, but with the wind on the shore there is generally a heavy sea. Discolored water is found a long way off, but it is deep. There are two channels over the bar marked by stakes on the port hand, and by stakes with branches on them on the starboard hand; the sands are changeable. A pilot attends at the bar to guide the vessel.

Campos.—The town of Campos is situated about 25 miles from the mouth of the river, on the right bank, and is the chief town in the district. It has considerable trade, by means of small coasting vessels with Rio de Janeiro, to which it exports sugar, cocoa, coffee, spirits, etc. The population is 40,000.

Light.—From the south side of Parahiba do Sul river entrance, a *fixed* white light is exhibited at an elevation of 41 feet above high water, and should be seen in clear weather from a distance of 12 miles.

Cape St Thomé.—The low, uniform sandy shore slightly covered with vegetation known by the name of cape St. Thomé, and about 45 miles from the interior mountains, curves gradually from south round to the westward, having no salient point, and visible only at a distance of 4 or 5 miles. On the southern sweep of the shore, in lat. about 22° 3′ S., is a house visible 5 or 6 miles. At about 6¾ miles to the NE. of the house are three trees higher than the others, and nearly 1¼ miles to the northward of them is a sandhill.

Light.—A lighthouse 147 feet high, circular; upper part red, lower part white, is erected near the south extreme of cape St. Thomé.

The light is exhibited at an elevation of 161 feet above high water, and is a revolving white light *every minute*, visible in clear weather from a distance of 19 miles.

St. Thomé bank extends off the land in an easterly direction on the parallel of 22° 3″ S. for nearly 10 miles, and its breadth from the 6-fathom line of soundings along each side of it from north to south varies from ½ to 2½ miles. In this space the sea breaks heavily in different places with NE. winds, but seldom with NW. winds, having between the breakers depths of 3 to 7 fathoms. It is steep-to. On the north side there are depths of 7 and 8 fathoms close to the breakers and on the south 7 to 13 fathoms within ½ mile. The outer breaker is about 9 miles from the shore and between 1½ and 3 miles east of it from 11 to 14 fathoms water. The inner breaker is 2 miles from the shore, and about ¾ mile inside it is a channel carrying from 3 to 5 fathoms water. The current in this vicinity is often rapid, and depends on the force and direction of the wind.

Soundings.—The captain of the steamer *Equateur* has obtained the following soundings off cape St. Thomé: 7⅔ fathoms, fine sand, in latitude 21° 56′ 30″ S., longitude 40° 37′ 15″ W.; 7⅓ fathoms, fine sand, in latitude 22° S., longitude 40° 40′ 45″ W.; 21⅓ fathoms, coarse sand, black specks, broken shell and coral, in latitude 22° 05′ S., longitude 40° 40′ 45″ W.; 26⅔ fathoms (same bottom as 21⅓ fathoms), in latitude 22° 09′ S., longitude 40° 40′ 45″ W.

Coast.—At the distance of 6 miles from the isolated house is the Barra Iguassu, leading into the river of that name, and 3 miles beyond it a cocoanut tree. At 3 miles westward of the cocoanut is another tree, with four or five houses, between two outlets from lake Feia. During the rainy season this lake forces its way to the sea through several openings, the principal of which is named Barra do Furado, situated 12 miles west of the cape, with several fishermen's houses around it. At 33 miles farther west is the mouth of the rio Macahé, having SE. of it a small islet named Papagaio, and S. 73° E. (S. 66° E. mag.), distant about a mile from the latter, is a rock, barely awash, which does not break, with 5 to 8 fathoms water close to it.

The eastern part of this low shore is named the praia do Furado and the western the praia do Paulista. The whole is clear of danger, with the exception of Hermes rock, N. 54° E. (N. 61° E. mag.), distant 3¼ miles from Papagaio islet. Between the mouth of the Macahé and that of the rio das Ostras, 13 miles to the SW., is Pecados Mortaes point, a spur of the serra de Iriry. Northward of this point the shore is named the praia das Pedrinas and southward of it praia Iriry. This latter part is foul and sunken rocks lie off from 1½ to 2 miles from the beach. It is not advisable to approach within 3 miles.

From the mouth of the rio das Ostras the shingle shore curves to the southward and eastward for about 18 miles to cape Busios, a high, bold point projecting northward and forming Santa Anna bay. The rivers San João and Una flow into the sea between the Ostras and the cape. The serra do San João, 2,657 feet high, north of the river of the same name, and about 3½ miles inland, is an isolated conspicuous mark, and 20 miles northward of it is the Frade de Macahé, 5,740 feet high, a remarkable peak leaning to the northward, with the serras of the same name extending to the SW. and those of the Imbé to the northeastward.

Hermes rock is about 12 yards in extent, NNW. and SSE., and 4 yards wide. It rises almost perpendicularly from the bottom, forming three heads, on the SE. of which the depth is 4 feet, and on the two others 10 to 14 feet at low water. The bottom around is mud and the depths 5 and 6 fathoms, excepting for 54 yards in a NE. direction from the rock, where the depth is 4 fathoms and the bottom coral. The water over the rock does not break. From the rock, which is distant 1½ miles from the beach, the church of Santa Anna bears S. 73° W. (S. 80° W. mag.).

The church of Santa Anna stands southward of the center prong of the Iriry mountain. This mountain is small, detached, has four peaks, the center being the largest and highest, and rises inland a short distance south of the port of Macahé. Imburo hill rises a little north of the town of Macahé, is the largest hill in its vicinity, and its summit is covered with wood and inclines to the south. Deitado hill is in the same direction as the preceding one, a little more inland, and, having a large spot on it, is easily recognized.

When bound to the northward from the anchorage off Macahé, to avoid the Hermes rock, do not steer to the NE. until the vessel is eastward of the Santa Anna islets. If it is necessary to tack in making the northern board, the church of Santa Anna should not be brought on with Iriry mountain until the vessel is eastward of the meridian of the islets.

Macahé.—The mouth of the rio Macahé lies about NW., distant 4½ miles from the largest of the Santa Anna islets, and which serve to identify it. A small fort stands on the southern point of entrance. The river is about 70 yards wide, and admits vessels of 9 feet draft at high water. The town of the same name, consisting of about 150 houses, stands on rising ground near the mouth of the river, where also, near the summit, is the church and flagstaff. If the flag be hoisted it is a signal that the entrance is safe. In the river, water may be obtained in any quantity; and small craft can proceed up about 30 miles. At times the water from the river causes the sea in the vicinity of Santa Anna islet to be much discolored, like that of a sandbank.

Tides.—It is high water, full and change, at Macahé at 2h. 50m., springs rise 4½ feet.

Imbetiba is a small bay situated about ½ mile south of the rio Macahé; the harbor of Imbetiba is a free port, with a breakwater and piers. The principal pier is 500 feet long, with three cranes, capable of lifting a weight of 5 tons. There is a depth alongside the pier of about 16 feet at low water. The railroad runs on the pier, receiving cargo directly from the vessels. There is also a jetty, near which there is 16 feet at low water. The anchorage in the port is not considered secure during the months of August and September. Vessels proceeding to Imbetiba have to clear inwards at Rio de Janeiro, unless loaded with coal and direct from Europe.

Pilots can be obtained off Santa Anna island.

Santa Anna, five small islets, lie in a NE. and SW. direction over a space of 2¼ miles. The center islet, 492 feet high, is the largest. Two rocks above water lie off the NE. end of the easternmost islet, from which a shoal extends to the northward nearly a mile with 10 feet water on it. The channel inside them is impeded by a bank extending from the north end of the largest islet to the main, with 3¾ to 5 fathoms water over it, the greatest depths being about halfway across. The bank is steep-to on both sides, the water shoaling from 7 to 5 and 3¾ fathoms. With the exception of this bank the soundings round the islets are regular.

Anchorage.—On the west side of the islets there is anchorage in 5 to 7 fathoms water, sheltered from easterly winds, but exposed to the SW. and NE.; with the latter there is seldom much swell. The best route to this anchorage is round the southern islet, which is clear of danger.

Anchorage will be found with the SW. part of the large islet bearing S. 4° E. (S. 3° W. mag.), and the northern part S. 82° E. (S. 75° E. mag.) in 7 fathoms water, about ¾ mile from the sandy beach. Large vessels should anchor farther to the southward, with the SW. point of the large islet to the eastward of S. 51° E. (S. 44° E. mag.), distant one mile, in about 7 fathoms, as the water shoals suddenly on the SW. side of the bank, and likewise toward a sandy beach on the large island.

About the middle of the sandy beach of the large islet there is a passage through the trees to a well of water; firewood may be obtained here in any quantity close to the beach, and it is said that coasters may careen here.

Tides.—It is high water, full and change, at Santa Anna islets at 2h. 30m.; springs rise about 9½ feet.

Santa Anna bay.—Rio das Ostras enters the sea in Formosa bay, the northern part of Santa Anna bay, the anchorage off which, sheltered by the point and islets to the eastward, is much frequented by coasters of 10 to 12 feet draft, trading to Rio de Janeiro.

Barra São João, situated 5 miles south of rio das Ostras and 10 miles from cape Busios, has about 12 feet on the bar at high water, which is one of the best on this coast. It is much frequented by coasters. The population of the town and district is about 5,000.

Busios (Armacao) bay, westward of cape Busios, affords sheltered anchorage to vessels from southeasterly winds, in 4 to 8 fathoms, muddy bottom.

Islets.—Rocks.—A small islet, named Branca or White islet, lies at the eastern entrance to the anchorage; and at 2¼ miles westward of it is Feia islet, 295 feet high, and wooded, with a rock off its NE. side, at the distance of 600 yards; and at the distance of ¾ mile in the same direction is a rock which partly uncovers at low tides, with 11 fathoms close to it. The highest peak of Ancora islet, east of the cape, in line with the NE. side of Branca islet, leads on the rock. Ancora islet, open northward or southward of Branca islet, leads clear of it. The passage between Branca islet and the main should not be used in a sailing vessel unless with a fair wind; with steam it may be taken at any time.

João Fernandez reef, which breaks, is situated 400 yards SE. of the point of the same name at about 200 yards from the coast.

Busios bay has a white sandy beach. In the western part of it is Raza islet, with breakers extending about ½ mile east southeastward; and at ½ mile northward, and nearly the same distance off Diego point, is Coboclo rock or islet.

Anchorage, open to northerly winds, will be found NW. of the village of Busios in 7 fathoms, about 600 yards from the shore.

The village consists of about 30 houses. Water in small quantities, fruit, and poultry may be obtained.

Ancora islets.—At about 5 miles eastward of cape Busios is the eastern and largest of two islets, seen at a distance of 20 to 25 miles in clear weather, named Ancora, or Anchor, islets. To the southward of the inner one is a large white rock, and connected to it by a reef. The eastern islet, 360 feet high, is said to resemble a cardinal's hat. Between the islets there are depths of 23 or 24 fathoms, and in midchannel, between cape Busios and the inner Ancora, from 18 to 21 fathoms.

Coast.—Islets.—From Criminso point, 344 feet high, at 1¼ miles SSE. of cape Busios, the bold coast trends to the SW. for nearly 2½ miles to Geriba point; between are two little bays, with the small islet of Boi at the entrance to the northern one; in the southern bay is a sandy beach named the praia do Ferradura. Xerne point is 11 miles SW. of that of Geriba; the coast between forms an indentation of about 3 miles deep, with three semicircular bays, whose beaches are named, respectively, praia do Geriba, praia do Perdido, and praia do Pontal; Emerina point, separating the two first bays, is 525 feet high; two rocks above water lie off the point, and a sunken rock a mile eastward of it.

Pero point divides the second and third bays; the shore is bold from thence to the SW. for 2 miles, as far as the Barra Nova, the entrance to Araruama lagoon at the north end of Pontal sandy beach. Here is the village of cape Frio, with a small fort. Between Geriba and Xerne points, but chiefly fronting Perdido bay, are several islets extending 5¾ miles in a SW. by W. and NE. by E. direction, and in line with the outer Ancora islet. These islets, beginning from the NE., are named Breu Pargos, 213 feet high; Cavallos Comprida, the largest and 357 feet high; Irmãos and Papagaios, 377 feet high; they are clear of danger, and 20 fathoms water will be found at a distance of about 2 miles.

Araruama lagoon extends nearly parallel to the coast for 21 miles westward of cape Frio, with a breadth varying from ½ to 7 miles. There is a depth of 9 feet at the entrance, which lies 8 miles north of cape Frio; the navigation of the lagoon is intricate, but there is a depth of 6 feet to the town of Port Frio, 2 miles within the entrance, and which town is connected with Rio by telegraph.

Cape Frio, the southern extremity of the island of the same name, is high, rugged, and remarkable in its outline; it forms the elbow of the province of Rio de Janeiro, is the southeastern extremity of the coast of Brazil, and may be seen in clear weather from a distance of about 45 miles. When seen from the east or west the island appears like two mountains, the northernmost being the higher. On a NNE. and SSW. bearing, they appear as one mass with a double summit like two small points.

At about ¾ mile NE. of the cape is a small islet close to the shore, and at nearly 200 yards southward of the cape is a rocky patch with 2½ fathoms water over it. The 100-fathom line of soundings curves round the cape eastward of it at the distance of about 70 miles, and southward of it at 35 miles, and there are depths of from 30 to 50 fathoms at 2 miles from the land.

Electric telegraph.—Vessels bound to Rio de Janeiro on approaching cape Frio are required to indicate by means of the international code of signals the following particulars, namely: Ship's name, port of departure, days of passage, cargo on board, consignee's name, shipping and commercial news. This information will be transmitted to the exchange at Rio de Janeiro by the electric telegraph established at cape Frio. When passing at night or in foggy weather, such news to be furnished to Negra point or Santa Cruz stations. Vessels not possessing the signals may still anticipate the news of their arrival at Rio de Janeiro by writing the same information in large white letters on a blackboard and hanging it on the ship's side passing fort Santa Cruz, at the entrance of the harbor, when the telegraph therein established will convey the news to town.

Signal station.—The signal station near cape Frio is situated on a hill about 3 miles N. 32° W. (N. 25° W. mag.) of Cape Frio lighthouse, and S. 10° E. (S. 3° E. mag.) of Nostra Sa des Remedios church. It consists of a large white house with a red roof and a flagstaff on each side.

Light.—On Focinho do Cabo point, the southern extreme of Cape Frio island, is a round tower 53 feet high, painted white, which exhibits at the height of 474 feet above the mean level of the sea a white *flashing* light, which shows one flash every twenty seconds, followed by a total eclipse, visible seaward through an arc of 225°, or between the bearings of S. 45° W. (S. 52° W. mag.) and east (S. 83° E. mag.). The light should be seen in clear weather from a distance of 30 miles but is not visible in the vicinity and westward of Ancora and Papagaios islands.

Port Frio, on the NW. side of Cape Frio island, is a secure anchorage, except with NE. winds. The harbor is about a mile in length and breadth, having 6 to 16 fathoms water; the holding ground is moderately good. The entrance between the north end of the island and isle dos Porcos is about 1,400 yards wide, with 15 to 20 fathoms, over fine sand and mud. There is a narrow channel to the anchorage close westward of Cape Frio island of about 2¼ fathoms between the island shore and the sandbank forming the west side of the channel. This bank, on the shoalest part of which there is a depth of 6 feet, continues to the shore and forms the western side of the anchorage; it breaks with NE. winds. There is also a narrow entrance, with depths of 10 and 12 fathoms, at the SW. end of Cape Frio island, between it and the continent, leading to the same anchorage, where there are depths of 8 and 10 fathoms.

In NE. winds the small steamers that carry on the coasting trade with the northern ports make use of this channel between Cape Frio island and the main, and by keeping very close to the island shore carry about 13 feet of water, by which means they escape the westerly currents then prevailing. It must be remembered that a telegraph cable stretches across the channel at the height of 90 feet above the sea.

A small fort in ruins stands on St. Sebastião point, a rocky point between two sandy coves on the NW. side of the harbor, and a little within the fort, at the bottom of praia do Angra, is the village of Nossa Senhorra des Remedios, or Cabo Frio, occupied chiefly by fishermen (about 300), where fresh provisions may be obtained

Anchorage.—The best anchorage in port Frio is in praia do Forno, midway between St. Sebastião and Angra (Agoa) points, in about 7 fathoms, or farther in.

H. M. S. *Mallard* anchored here in 1879 and found it a secure anchorage, but recommends mooring with open hawse to the eastward, as the wind comes in puffs from the NE. over the hills, and the anchorage ground being limited, leaves little room to drag.

This anchorage is used by vessels of war stationed at Rio as a health resort.

The best landing is just within and northward of St. Sebastião point, whence a path leads to the village.

Water may be obtained from wells in the coves, as well as on the island near its west end. Abundance of fish may be taken by the seine in the coves.

Tides and currents.—SW. and NE. winds produce NE. and SW. currents from ½ to 1½ miles an hour. With SW. winds there is a SW. eddy inshore; the currents usually precede the winds. It is high water, full and change, at port Frio at 2h. 40m.; springs rise 5 feet; SW. winds raise the water 2 or 3 feet.

Winds.—The winds off cape Frio are seldom found to the southward of east, and in the northern monsoon they are generally to the northward of NE. Heavy squalls are occasionally met in rounding the cape, which require every precaution to guard against.

Coast.—Negra point.—From cape Frio to the entrance of Rio de Janeiro the course is about west and the distance 63 miles. The coast between is everywhere steep-to and consists of a yellow sandy beach, backed by high land a few miles to the northward, showing in peaks and hills. At about 26 miles eastward of Rio de Janeiro the sandy beach is interrupted by Negra point, a dark level piece of land about ½ mile in extent and some 80 feet high, which terminates abruptly, and may be recognized by the land at its back being very high and dark, with more irregular hills to the eastward. At 10½ miles eastward of Negra point, on a sandy hill, is a church dedicated to Nossa Senhora de Nazareth, and being white forms a conspicuous mark to the offing.

The shore is here named Masambaba, and within it is the Araruama lagoon. Between cape Frio and Negra point at the distance of 5 miles from the coast the depths are from 31 to 38 fathoms, sand, gravel, and broken shell, and at about 40 miles from the shore is the 100-fathom line of soundings. North of the Marica islets, near the beach, and 3 or 4 miles eastward of the False Sugarloaf, is a round remarkable hill, about 850 feet high, with the western side of its base level with the low land, and much resembling Redonda island. This hill will point out the position of the Marica islets.

Marica islets.—At 14 miles westward of Negra point, and about 3 miles from the beach, are two islets, named the Marica, about 120 feet in height, and may be approached with safety. The water near the islet is deep, and there are no dangers but what are in sight. On the eastern side the sea commonly breaks with great violence. Between the islets and the main there are 13 and 10 fathoms water close to the beach. Temporary anchorage, with fine sandy bottom, will be found westward of the islets with northerly winds; the best position is in about 15 fathoms, with Negra point in line with the northern islet; and the south islet S. 44° E. (S. 38° E. mag.), distant about one mile. There is landing near the NW. end of the larger islet.

CHAPTER VIII.

COAST OF BRAZIL—RIO DE JANEIRO TO CAPE CASTILLO AT THE ENTRANCE TO THE RIO DE LA PLATA.

Rio de Janeiro harbor.—This harbor is one of the largest in the world, and can scarcely be excelled. It covers a space of about 16 miles in a north and south direction, gradually widening from about ¾ mile at its entrance to 15 miles at its head. It is interspersed with numerous islets and surrounded by high wooded mountains; its shores are scattered with villages and various plantations; many rivers run into the harbor, and around it are several sandy bays. The entrance is bounded on the west by the base of the Pao de Açucar, or Sugarloaf, with fort São João immediately within it, and on the east by fort Santa Cruz at the foot of a mass of granite.

There are no dangers in entering the harbor. To the northward of the anchorage the water continues deep, and the harbor is navigable for small vessels in every part of it.

The City of Rio de Janeiro, capital of the republic and province, and the most important town in Brazil, stands on the western side of the harbor, at the foot of a high range of mountains named the Corcovado, which bounds the plain on the west. It is built on level ground somewhat in the form of a parallelogram. The streets are straight and well lighted, paved with granite from the adjacent quarries, and well drained. The houses are mostly built of granite, seldom more than two stories high, rough or whitewashed, with red tile roofs.

Small steamers ply regularly between Rio and Nictheroy on the opposite side, and to Piedade at the head of the harbor.

The population of the city of Rio Janeiro is reported as nearly 1,000,000. The principal articles of import are cotton and silk manufactures, flour, wine, etc.; and the exports are coffee, sugar, hides, and tobacco.

A railway connects Petropolis, a town situated high amongst the Organ mountains, with the northern shore of the harbor.

The United States minister resides here. There is also a consul-general and a vice and deputy consul-general.

Landing should be effected on the north side of the steam ferries, as that on the south is used for embarking yellow fever and smallpox cases for transit to the hospital on the east side of the harbor.

Time signal.*—The signal is made from the observatory on mount

---

*Reported not to fall on Sundays and holidays.

Castello by means of a red drum. It is expanded to its proper size at 5 minutes before noon, and collapsed at noon—Rio de Janeiro mean time—equivalent to 2h. 52m. 41·4s. Greenwich mean time. The longitude of the observatory on mount Castello has been determined to be 43° 10′ 21″ W. This places Fort Villegagnon flagstaff in longitude 43° 9′ 29″ W.

The time ball requires a fraction of a second of time for its collapse, and allowance is made for this by freeing the electric-detaching mechanism five-tenths or six-tenths of a second before mean noon. Therefore, noon, mean time, should be considered as corresponding to the exact instant at which the ball is shut (collapsed).

The firm of Ferdinand Rodde & Co., by permission of the authorities, have established telephonic communication between their office and the observatory, and masters of vessels may obtain the errors of their chronometers daily, free of charge.

Supplies.—All kinds of supplies can be obtained in abundance at Rio, and the port is preferable to any on the coast. Ships in want of repairs can be accommodated; there are several steam factories, and building slips and docks which will take vessels of large draft. Water is supplied from floating tanks, both for vessels of war and merchant vessels. It is not fit for drinking purposes. Merchant vessels, calling for refreshments only, are allowed to enter the harbor, without paying anchorage dues, but are subject to all other port charges.

Coal.—Mucangue Pequena (Coal island) is the principal coal depot, and there is every facility for vessels of any size coaling alongside.

Vianna island, situated ¼ mile northeastward of Coal island, is also a depot for coal.

About 15,000 tons are usually in stock at Rio; 800 tons can be put on board per day alongside the wharf at Coal island. Vessels in the anchorage are coaled by lighters, which are towed alongside, and with but little interruption from the weather.

Docks.—On the north side of ilha das Cobras are two Government docks. The dimensions of No. 1, named the Imperial dock, are as follows: Total length, 423 feet; length on blocks, 392 feet; width at coping, 92 feet; width on floor, 59 feet; width at entrance, 70 feet; height, 33 feet; depth on blocks at high water springs, 24 feet. No. 2, or Santa Cruz dock: Total length, 258 feet; length on blocks, 240 feet; width at coping, 70 feet; width on floor, 35 feet; width at entrance, 55 feet; height, 28 feet; depth on blocks at high water springs, 20 feet.

On Coal island, on the eastern side of the harbor, there is the Commercial dock; the following are the dimensions: Length on blocks, 405 feet; width at coping, 60 feet; width at bottom, 30 feet; width at entrance, 45 feet; height of floor to coping, 23 feet; depth on blocks at high water springs, 18½ feet.

The Saude dock is situated on Saude point, one mile westward of ilha das Cobras: Length on blocks. 380 feet (in 1886); when finished, to be 500 feet; width at top, 92 feet; width on floor, 66 feet; width at entrance, 70 feet; depth on blocks at high water springs, 24 feet. This dock is in constant use.

There is a small patent slip on Enchadas island.

Port charges.—Good towboats are to be had, if required, but the rates are high, amounting to 800 milreis for a vessel of 1,500 tons, both ways. There are native pilots, and one is generally employed. Port duty on three-masted vessels, 12,800 reis; two-masted vessels, 9,600 reis. Ballast costs from one to 2 milreis, according to quality.

A quarantine station for the port of Rio has been established at Albrahoa bay, Ilha Grande, about 60 miles to the westward of Rio. A landing pier about 66 yards long, with crane, and also a semaphore for communicating with vessels, has also been established there.

Forts.—At 600 yards NE. of São João is a low, square fort, with flagstaff, named Lage, standing on some isolated rocks, on which, in strong breezes, the sea breaks with violence; a sunken ledge extends 200 yards westward of it. At 1½ miles farther in, on the west side, is the village and fort of Villegagnon, standing on the edge of a bank of shoal water which skirts the west side of the harbor from fort São João to ilha das Cobras.

Fort Santa Cruz, on the east point of entrance, forms the principal defense of the harbor, and is a work of considerable strength; it is flanked by batteries on the east and west, and protected by a regular front for musketry on the land side. Fort Pico is within Santa Cruz and forts Boa Viagem and Gravata at either end of Vermelha beach, Nictheroy side of harbor. There are several minor fortifications in other parts of the harbor.

Ilha das Cobras, or Serpents island, at the NE. part of the city, is strongly fortified, the highest part being nearly 80 feet above the sea. The island slopes gradually on the east side to the water's edge.

A bar of sand with some rocks extend to the SE. from Cobras for a distance of ½ mile, fronting the city and leaving a small passage between the south end and Calhabouco point. The least water on this bar is 6 feet; at low water with a heavy swell the sea breaks on it, and renders it dangerous for boats passing across; between the bar and the city there are from 2 to 7 fathoms.

Rat island.—About 400 yards off the east end of Cobras is Rat island with some rocks between. A large brick building, surmounted by a tower, has been built on Rat island. It is at present used a custom-house. It forms a conspicuous object in entering. It is nearly in range with forts Lage and Villegagnon, and is more distinguishable than the latter. A patch of 21 feet, marked by four red buoys, lies N., 5° E. (N. 11° E. mag.) nearly 400 yards from Rat island.

Enchadas island, situated 1,200 yards north of ilha das Cobras, is nearly round, and about 200 yards in diameter. Off its west side a shoal extends to the distance of 100 yards; the extremity of the shoal is marked by a buoy surmounted by a flag. Also a patch of 21 feet lies 400 yards NW. of Enchadas, and a patch of 2 fathoms at 200 yards distant.

Four can buoys, painted yellow, and surmounted by staff and globe, have been moored at about equal distances apart, to mark the direction of the water pipes laid between Enchadas and Cobras islands. Anchorage near the line of these buoys is prohibited.

Feiticeiras bank.—Eastward of Enchadas, 600 yards distant, is Feiticeiras bank, a nearly circular rocky shoal about 200 yards in diameter. An iron rod beacon, surmounted by an iron flag, is erected on the bank, and five red buoys mark the edge of the bank in 5½ fathoms, each about 200 yards distant from the beacon. Also two red buoys are moored northeastward, distant 550 yards from Feiticeiras bank. About 120 yards southward of the bank is a patch of 2 fathoms depth.

Lecky rock lies eastward about 200 yards distant from the jetty on the east point of Enchadas island; it is 50 feet in diameter, conical, with 2½ fathoms on it at low water springs, and is steep-to on all sides; its east side is marked by a red buoy, surmounted by a ball.

A red buoy with flag lies about 300 yards southward of Enchadas island, and a similar one about 800 yards southward of Feiticeiras bank.

There is a deep channel to the westward of the rock, but vessels proceeding to the wharves which are situated on the north side of Enchadas island are recommended to pass outside or to the eastward of Feiticeiras bank.

Anchorage.—Vessels of war anchor anywhere eastward of the city, but southward of a line drawn from Rat island to the largest church having two towers, and with the Pao de Açucar, or Sugarloaf, open eastward of fort Villegagnon, in 15 to 21 fathoms water, muddy bottom; or more westward if convenient, with the Sugarloaf over the western house in fort Villegagnon in 7 or 8 fathoms. Several sets of mooring for vessels of war are laid down between Rat island and Villegagnon. Vessels generally moor open hawse to the SW. Merchant vessels anchor on first arrival, below Villegagnon fort; afterwards northward of ilha das Cobras in 5½ or 6 fathoms; and coasters off the city southward of Cobras. Vessels are prohibited from anchoring in the fairway of the ferry steamers plying between the city and Nictheroy. The authorities require all vessels to have buoys on their anchors.

There is also anchorage between fort Santa Cruz and Jurujuba point on the eastern side of the harbor, in 5 or 6 fathoms water.

Islands off the entrance.—Several small islands lie off the entrance to Rio; on the east side are those of Pai and Mai (father and mother); the former lying 4 miles SE. of fort Santa Cruz, and the latter ¾ mile more to the eastward, with a depth of 20 fathoms between them. A reef extends from the NE. end of Mai island, with a depth of 20 fathoms between it and Menino island close to the shore. These islands are otherwise steep to.

Raza island, about 800 yards in length and about 270 feet high, lies S. 36° W. (S. 42° W. mag.) 5½ miles from Pai island, and when seen from the eastward appears wedge shaped, sloping part northward. A square white light tower, 50 feet high, stands in the center of the island, and there is a flagstaff, with a landing place at the NW. end. An islet lies close off its north point. The depth of water between this island and Pai is from 19 to 26 fathoms, gray sand and mud.

Redonda island, 726 feet high and conical, lies westward 2½ miles from Raza, with about 30 fathoms of water between them. A small islet lies at the distance of 200 yards from its SW. side; and about a mile SW. from the summit of Redonda is a dangerous reef with a rock 6 feet high on it.

At 1¾ miles northward of Redonda is Comprida island, with about 20 fathoms water between them; and close to the north of the latter are Palmas and Cagada. At ½ mile ENE. of Cagada, the easternmost of these islands, is a rock 20 feet high, and between Cagada and Comprida are two reefs.

On the west side of entrance to the harbor, at 1,300 yards southward of the base of the Sugarloaf, is an island named Cotunduba, 228 feet high, having between 9 to 13 fathoms water, over sandy bottom. A reef extends a little southward from the island, with 9 fathoms close to.

Lights.—The light tower on Raza island is 50 feet high and exhibits at the height of 315 feet above high water an electric flashing light, showing *two white flashes* and *one red flash* of about *four seconds'* duration each, with an interval of about *eleven seconds* between flashes. The light should be seen in clear weather from a distance of 24 miles. Has been seen 30 miles.

At fort Santa Cruz is a *fixed* white light, visible 7 miles.

On fort Villegagnon is a *red* fixed light, exhibited from an iron column, over an arc of 225°, or between the bearing of N. 32° W. (N. 26° W. mag.) and S. 77° E. (S. 71° E. mag.), and is visible 8 miles.

On Calhabouco point is a small *fixed red* and *green* light. It is *green* from seaward as far as the line joining the light and the hospital on Jurujuba point, and *red* northward of that line.

Tides.—It is high water, full and change, at Rio de Janeiro at 3h.; springs rise 4 feet and neaps 3 feet. The usual rate of the tide is about ¾ mile an hour; springs run 1½ miles. The ebb runs much longer than the flood, especially after heavy rains, and it has been known to run a whole day without intermission; strongest on the western side, but an eddy will sometimes be found on the eastern side, when the water is observed to rise. At the anchorage in front of the town the stream is occasionally irregular. Outside the entrance the ebb is stronger on the western shore.

Winds and weather.—In the harbor the sea breeze generally sets in between 10 a. m. and 1 o'clock, and ceases in the evening between the hours of 7 and 11. The land wind blows all night, ends at 9 or 10 o'clock in the morning, and is succeeded by an interval of calm. At the full and change of the moon heavy squalls from the NW., named "Terre altos," sometimes succeed the sea breeze, lasting from four to six hours. The SW. is the bad weather quarter in Rio harbor, the wind blowing in fierce and dangerous squalls, with much rain. Thunder, storms occur most frequently in the summer, generally with winds from NNW. and west, and rarely with those from east or south. When the outline of the Organ mountains, which bound the northern side of the harbor, is clear and sharp, rain may be expected. April, May, and June are the rainy months.

Landmarks.—The entrance to the harbor of Rio Janeiro is known by several remarkable mountains in its immediate vicinity. The Pao de Açucar, or Sugarloaf, rises in that form from a tongue of land on the west side to the height of 1,270 feet, and differs from the many others on this coast by the inclination of its summit to the westward. At 2¾ miles westward of the Sugarloaf is the peak of the Corcovado, 2,272 feet high; thence the mountain range trends in a westerly direction for a distance of 5 miles, to mount Gavia, 2,575 feet high, with a remarkable flat top and perpendicular sides. It may be seen in all directions seaward from east to SW., and can not be mistaken.

When the summits of these mountains are free from clouds they present in a remarkable manner the figure of a man lying on his back, the Gavia forming the head and the Sugarloaf the feet. On the eastern side of the entrance, at 6½ miles eastward of fort Santa Cruz, at the western termination of the high land, is the False Sugarloaf, rising close to the shore to the height of 1,317 feet. At 3 or 4 miles east of the False Sugarloaf is a remarkable round hill about 850 feet high, sloping on its west side to its base on a level with the low land; its east side, about halfway down, forms a notch with some tableland to the eastward. Farther eastward is the summit of a distant range, named, from its resemblance, Castle hill.

Directions.—A sailing vessel from the northward or eastward during the NE. monsoon should make cape Frio, and a berth should be given the coast between the cape and Rio, as a constant and sometimes heavy swell sets in; but during the SE. monsoon the ilha Grande, the morro de Marambaia, or the Gavia are the best objects to make. An 8-fathom bank, said to lie about south distant 46 miles from Raza island, should be avoided in rough weather. The islands at the entrance of the harbor should not be approached until the sea breeze is well set in, as a vessel may run into a calm between the sea and land winds, and be exposed to the swell and current and set west of Raza, which is to be avoided. Whilst the sea breeze is strong enough to enable vessels to overcome the ebb tide they may safely enter by day or night. When vessels enter the harbor at night a signal is made from fort Santa Cruz to the city, which is not to be understood as interfering with the vessels entering.

The land wind is often accompanied by gusts, which are sometimes heavy, especially at the full and change of the moon, but they seldom extend outside the islands; and as the current is nearly always running out, if there is any doubt about reaching the anchorage a sailing vessel should keep outside Raza island and wait for the sea breeze on the following day. If, however, a vessel be compelled to anchor, it is better to close with the eastern shore, where there is less swell.

The passage between Raza and Pai islands is the widest, and generally used. The islands are steep-to, and a vessel may pass close to them on either side. There are no dangers, nothing to avoid that is not seen, and deep water on both sides of the entrance. The north extreme of fort Villegagnon in line with fort Lage, N. 25° W. (N. 19° W. mag.) is a good mark, and leads in the best water. Vessels are required to pass within hail of fort Santa Cruz to answer any questions that may be asked; and if they have not already anticipated their arrival off the town of Rio, when passing cape Frio they may do so by writing the name, etc., on a blackboard, and the news will be transmitted by the telegraph established at the fort. It is not necessary to shorten sail, and there is plenty of water close to the rocks. After passing the fort, steer about NNW. for the anchorage. A steamer at night should bring Raza light to bear S. 5° W. (S. 11° W. mag.) and steer N. 5° E. (N. 11° E. mag.) for Santa Cruz light; pass within hail of the fort, and proceed as before. "There is occasionally a very heavy sea at the entrance of the harbor, so heavy at times that large ships are compelled to turn back."

The water will then deepen, and the soundings will be lost for a short time with the hand lead. Villegagnon fort may be passed at the distance of 400 yards. Merchant vessels arriving are required to anchor a little below Villegagnon fort, where they are visited by the health officer. Merchant vessels passing Villegagnon fort are liable to be fired at and fined. The price of the first gun is $1.75, the second $3.50, the third $15. The master is required to deliver to the health officer all letters and papers, without exception, consignees' letters and all. If any should afterwards be found on board the vessel is fined. The harbor regulations will be given at the time of arrival by the guard officer; they are in Portuguese and French and English. They must be returned before the vessel leaves the port.

The passage between forts São João and Lage is not recommended for a sailing vessel, as the tides are irregular, and the wind may become variable under the Sugarloaf; but coasters work in on the western shore, and through this channel, against the land wind, assisted by an eddy current, found when the stream is running out, which it does for about eighteen hours out of twenty-four.

Vessels about to leave the harbor usually get in the fairway on the evening before departure, and weigh in the morning, with the land wind, which will generally carry a vessel outside the islands.

Route to the northward.—Vessels bound from Rio to the northward during the months of November, December, January, and February meet with fresh NE. winds which extend along the coast, especially in the vicinity of cape St. Thomé, and which causes a southerly current of about one or 1½ miles an hour, stronger near the coast than in the offing. During this season the wind is less northerly in the offing than near the coast. It is therefore necessary for a sailing vessel to stand from 450 to 600 miles to the ESE., and then tack, when the wind will be more to the eastward and the southerly current less strong.

The months of November and December, especially the latter, are the most unfavorable for vessels going to the northward, when it is necessary to stand well to the eastward; but during the two or three other months of the NE. monsoon, i. e., from October to February, a vessel should not stand farther eastward than actually necessary for weathering the Abrolhos islets, as from their parallel northward the winds will be about east or E. by S.

During the other months of the year, from March until September, a vessel should close the coast as near as possible; taking advantage of the change of wind near the land, and making short tacks to the eastward on meeting the fresh NE. winds off capes Frio and St. Thomé, which sometimes blow during the SE. monsoon; but they last only two or three days, and are succeeded by calms and light variable winds from SW. to SE. Then continue along the coast at the distance of 30 to 90 miles. A more easterly route is generally used, but if bound to Bahia it does not appear advantageous to stand too far off the land.

Tijucas isles are a cluster of small islets lying southward of cape Gavia, about 9 miles west of Rio. Meio, the eastern islet, lies one mile from the cape; and the southwesternmost islet, which is about 200 feet high, 1¾ miles from the cape. About ½ mile southward of the west end of the latter islet is a reef awash, and ⅔ mile eastward of the islet is said to be another reef, also awash.

Cape Guaratiba rises in a conical form to the height of 1,115 feet, and is the termination of the range of mountains that surround Rio de Janeiro. There is a rock above water close to the cape, named ilha Palma da Guaratiba, and one mile to the eastward is Raza isle, about 400 yards off shore. Half a mile westward of Raza isle is a sunken rock. From off the cape, Redonda island, with its steep shores intersected with white and dark green, may be clearly seen in fine weather.

Westward of cape Guaratiba, there is a passage named Barra Guaratiba, ¾ mile wide, having 2 fathoms water, leading into Sapetiba bay, eastward of Marambaia island. With SW. winds a heavy sea sets in, which renders the passage navigable only for small vessels of about 6 feet draft.

Marambaia island, 22 miles long and from ¼ to 2½ miles broad, is principally formed of a bank of sand from 20 to 40 feet above the level of the sea. At the west end is a hill named the morro de Marambaia, 2,066 feet high. It is covered with trees, and may be seen from a distance of about 30 miles. The island is more or less covered with creeping plants, brushwood, and mangrove. It is said to be steep on the south side, on which the sea breaks heavily; on the north side it is level, and abouuds with shellfish and sand larks.

Banks.—From Sena point, the NW. extreme of the island, a bank having from 1½ to 3 fathoms extends nearly 3 miles in a NNW. direction, leaving a passage about ¾ mile in breadth between it and Guahyba island into Sapetiba bay.

From Sena point a reef extends westward nearly one mile, and off Lucino point there is a ledge of sunken rocks. As Marambaia island is low, with the exception of the morro at the west end, it should be approached with caution in thick weather.

Marambaia rock (Eastern Lage), a bare islet 59 feet above the sea, lies 14½ miles to the westward of cape Guaratiba and about 2½ miles from the shore of Marambaia island, with 9 to 17 fathoms water all round, and 21 fathoms one mile south of it. When seen from the southward Marambaia rock has a conical appearance.

Breakers.—The commander of the steamer *Brésil* reports that he passed 2 miles southward of Marambaia rock in a perfect calm with heavy swell from seaward, and saw the sea breaking heavily and almost continuously for a distance of about 2 miles eastward from Marambaia rock, but he saw nothing of the breakers (Savoie rocks) shown on the charts about one mile to the westward of that rock, and marked "E. D."

Sapetiba bay covers a space of about 20 miles east and west with an average breadth of 6 miles north and south, and is protected by the Restinga de Marambaia. The western part of the bay is studded with numerous islands and rocks, having deep water and good anchorage between them; the depths vary from 12 to 3 fathoms, soft muddy bottom.

At about 2½ miles NW. of the eastern end of Sapetiba bay is Pedras point, with islets and rocks close to the southward and westward. From Pedras point to a point about 2 miles distant the shore forms a sandy bay, with the village of Desterro on its eastern side. Two miles west of Sapetiba is a rocky patch which uncovers at low water. At 2¼ miles NW. of Sapetiba point is the Barra Santa Cruz (mouth of rio Guandú), navigable for canoes. The village and church of Santa Cruz lie near the river, 4 miles from the entrance.

The United States is represented at Desterro by a consular agent.

The Itaguahy is navigable for boats of 4 or 5 feet draft. Here sugar is shipped for Rio de Janeiro. From the mouth of the Itaguahy to about 16 miles to the westward are numerous islands and rocks. The two largest of these islands are high and close to the mainland; that to the eastward is named Madeira; but the passage between it and the main is nearly closed by a tongue of land, leaving only a narrow boat channel.

The westernmost large island, 1,115 feet high, named Tacuruzà is nearly 3 miles in length NE. and SW., and also lies close to the main. The next island in size is Jaguanão, 656 feet high, and lies about 2½ miles southward of the west end of Tacuruzà, with several smaller islets around it. About 2¼ miles west of the south end of Jaguanão island, and 2 miles from the nearest part of the morro of Marambaia, is the Areia, a rocky shoal of about ½ mile in extent.

Guahyba, 623 feet high, lies off the entrance of Mangaratiba bay on the north shore, with 6 to 10 fathoms close to. At about 1¾ miles westward of the south point of Guahyba island, is Flat rock, just awash and steep to.

Directions.—Vessels bound into Sapetiba bay should round the morro de Marambaia at 2 miles distant in 10 to 12 fathoms water, and steer for the west peak of Guahyba island, bearing N. 5° W. (north mag). When about ½ mile from the south point of Guahyba steer N. 63° E. (N. 68° E. mag.) for the highest part of Tacuruzà islands, leaving the Jaguanão group on the starboad hand and carefully avoiding the Enchadas rock, which lies ½ mile N. 84° W. (N. 79° W. mag.) of Carapuca islet; and when Carapuca bears S. 5° E. (south mag.) steer S. 84° E. (S. 79° E. mag.), between Pedra Branca and Furtada island, into Sapetiba bay.

Vessels may anchor in 5 to 7 fathoms water under the south side of Madeira island, also southward of Pedra Branca, northward of the Jaguanão group or westward of them, and vessels of light draft in any part of the bay.

Tides.—It is high water, full and change, at Sapetiba at 2h., springs rise 5½ feet.

Mangaratiba bay, about a mile broad at the entrance and 2 miles at the head, is about 2 miles in length, and lies northward of Guahyba island. The village and church of Mangaratiba lie on the eastern side, and small craft may anchor in 1¾ to 2¼ fathoms water. The deepest water is on the west side of the bay. Vessels proceeding into this cove should be careful to avoid the Flat rock lying 1¾ miles westward of the south point of Guahyba island. The rock is most dangerous in hazy weather.

Ilha Grande bay, in the entrance to which lies the island of the same name, is about 17 miles from north to south and 12 miles from east to west, with an average depth of 10 fathoms. In the northern part of the bay lies Gipoia island, surrounded by clusters of smaller ones which have many outlying rocks and dangers. The outer and southern island of this group is named Coronel, and lies 2½ miles SW. of Gipoia island; it is small and has a sunken rock 800 yards to the west-northwestward. The shores of the bay are thickly studded with rocky islands with outlying sunken rocks, the most dangerous of which is Meros shoal, a patch 600 yards in diameter, lying nearly in the center of Ilha Grande bay, 2¾ miles N. 43° E. (N. 48° E. mag.) of Meros island. The depths around this shoal are from 8 to 11 fathoms, with 14 fathoms at ¾ mile distant. There is also a patch of rocks ½ mile north-northwestward of Meros island.

Many small streams empty themselves in Ilha Grande bay, and in its western part shoal banks extend a considerable distance from the shore.

Ilha Grande, 3,280 feet high and covered with verdure to the water's edge, is about 16 miles in length east and west, and 6½ miles north and south. Some parts of the island have been cleared and are under cultivation, but the greater portion is a dense mass of trees and underwood.

Signal station.—On the island is a signal station to which communication may be made by the international code.

Anchorages.—On the NE. side of ilha Grande are Palmas, Albrahao[*], and Estrella bays, affording anchorage for the largest vessels in 6 or 7 fathoms, muddy bottom, and where water, fruit, yams, pigs, and fowls may be procured. Steamers short of fuel may obtain an abundance of wood in Palmas bay; the necessary permission for cutting it should first be obtained.

Sailing vessels should not anchor too close in, as the wind baffles from the high land around the bays, making it difficult to sail out. A slight swell rolls into Palmas and Estrella bays, and in the latter, when there is any wind, landing is difficult. On the western side of Estrella bay a second harbor opens out, landlocked, completely sheltered, and an excellent place for a vessel to refit in. Albrahao bay affords convenient anchorage, with general depths of 7 fathoms, and 3 fathoms alongside the rocks; it is the quarantine station for the port of Rio de Janeiro, and has a landing pier 66 yards long, with crane and semaphore. Fever and ague are reported prevalent here.

Vessels bound into Palmas bay with the sea breeze may pass between Palmas islet and the shore, in 7 to 10 fathoms, keeping the shore side aboard. The channel is nearly ¼ mile wide, with 8 fathoms water close to the outer rock of the reef, extending southward from the islet, and in using this passage a vessel will save working into the bay. From the eastward, Palmas islet shows out conspicuously against the background formed by ilha Grande, being covered with darker verdure than the main island.

Eastern passage.—Castelhanos point, the east extreme of ilha Grande, is separated from Marambaia island by a passage 6 miles wide, which leads into Ilha Grande bay, between the island and the main. The passage is clear, the water deep, and there is good anchorage on muddy bottom in any part of it. The land is high, and the scenery in all parts of the bay exceedingly grand. Vessels at times are liable to meet with baffling winds, the sea breeze not reaching through, particularly in the summer, when it sets in from the southward. The land wind blows from the NE. during the summer, and from the NW. in the winter.

---

[*] A sunken wreck, with lower masts showing, lies in 7 fathoms in Albrahao bay, with Grossa point bearing S. 88° E. (S. 83° E., mag.) and Meio island N. 29° E. (N. 34° E. mag.) (1893).

Islets.—At one mile northwestward of Grossa point, the NE. entrance point to Albrahao bay, is Meio (Green) islet, 65 feet high, with its summit covered with green shrubs; and at 1¼ miles ENE. of it is Pao Pino (Tree) islet, having a single tree on its summit, the base being composed of bowlders of granite. Off Sta. Anna village, at the northern extremity of the island, are several islets; the largest and most northern is Macacos island, ½ mile from the village; and at a mile to the eastward, and about ¼ mile from the shore, are some islets surrounded by shoal water. One mile to the NW. of Macacos island is the small island Tacuatiba, with a patch of 4¾ fathoms, 400 yards to the NE. of it.

Sitio Forte bay, on the NW. side of ilha Grande, between Grossa (NW. point of island) and Aritiba point, is well sheltered and capable of accommodating several vessels in 9 to 10 fathoms, blue clay.

Supplies.—Fresh water, fruit, and fish can be easily obtained in Sitio Forte bay, but other kinds of provisions must be previously ordered.

Olga shoal, consisting of sand and shell, with several rocky pinnacles with one to 5 fathoms on them, is about 100 yards in extent, and lies in the bay eastward of Sitio Forte, with Banana point bearing N. 26° E. (N. 31° E. mag.) about ½ mile. There are depths of 8 to 13 fathoms close around the shoal.

Islets.—Rocks.—The shore of ilha Grande between Sitio Forte bay and Acaya point, the west extreme of the island, is bold and clear of danger. Branca island or the Western Lage, a flat, white rock, lies 1,800 yards north of Arcatiba point, on the west side of the island. To the southward of Acaya point are two sunken rocks, with 3¾ and 4½ fathoms, lying respectively S. 9° W. (S. 14° W. mag.), nearly one mile, and S. 26° W. (S. 31° W. mag.) 1¼ miles from the same point. These rocks have from 16 to 19 fathoms round them, and there is said to be a safe passage between them and Acaya point.

Rios bay.—At about 5½ miles westward of Castelhanos point, on the south side of the island, is the bay and village of Rios. There are two islets in the bay with anchorage inside them for small craft. About 2 miles southward of Rios is Jorge Grego island, said to be steep to, with a bay on its NW. side affording anchorage. A heavy swell sets towards the island.

Tides.—It is high water, full and change, off Estrella bay at 0h. 30m.; springs rise 5 feet, and neaps 4 feet; and at Parati 1h. 43m., springs rise 5½ feet. There is little or no stream.

Coast.—At about 9½ miles WSW. of Drago point, the SW. extreme of ilha Grande, is Joatinga point, the SW. entrance point of Ilha Grande bay. The point is high, and may be approached at a prudent distance. At 7 miles to the SW. of Joatinga point is that of Cairoçu, also high, the coast between forming a bay. From Cairoçu point the shore trends to the NW. and westward, forming a bay nearly 2 miles deep, between Cairoçu and Trinidad points; thence from Trinidad nearly west for 7 miles, then NW. into Batumirim bay, where there is anchorage in 2½ to 4½ fathoms, and off which are several islets and rocks, all above water. At 13½ miles westward of Cairoçu point and 3 miles from the shore is Cove islet, and 2½ miles farther westward is another islet. About 11 miles westward of Cairoçu point and 2½ miles inland is the peak of Parati.

Ubatuba bay.—About 24 miles to the westward of Cairoçu point is Grossa point, which, stretching out about 2 miles from the land as a peninsula, forms Ubatuba bay to the northward of it. A sunken rock lies ½ a mile northward of Grossa point, and another within 200 yards SE. of the point.

Anchorage.—There is anchorage for small vessels in 3½ fathoms, 1¼ miles eastward of the town of Ubatuba. The road is exposed to the swell from seaward. Fresh provisions are scarce.

Great Porcos island, situated 4½ miles southward of Grossa point, is moderately high, about 2½ miles in length and 1½ miles in breadth. Off its south point is an islet with a passage between for boats; and two other islets lie off its SE. and NE. sides at the distance of one mile, with 6 to 15 fathoms between. The two latter islets are wooded, and 2 miles distant north and south of each other, with 6 to 11 fathoms water between them.

Anchorage.—On the north side of Great Porcos island is Palmas bay with a village at its head, nearly a mile in breadth and about ¾ mile deep, where vessels may anchor in 3¾ to 4 fathoms, muddy bottom. The bay is sheltered from all winds except those from NE. to E. by N., which seldom continue long enough to cause a heavy sea, and is an excellent place for a vessel to refit.

Directions.—In running for Palmas bay, strangers will find the island a little difficult to make out, owing to the high land northward of it; but as the water is deep close to, there is no danger in standing on until the white house on the NE. end of the island is seen passing inside, between, or to the northward of the islets. The tide here, affected by the prevailing wind, rises about 3 feet.

Supplies.—Water is plentiful and easily obtained from the SE. part of the bay. There are several small villages on the mainland, where fresh beef and stock may occasionally be obtained.

Flamingo bay.—The NW. point of Great Porcos island forms with a point projecting from the mainland a narrow channel rather more than ¼ mile in breadth, carrying 16 fathoms of water, through which vessels can pass when the wind is steady, by not keeping too close to either point, into Flamingo bay. This bay is about two miles deep, more than 1½ miles in breadth, and affords good anchorage in 2 to 5 fathoms water; southerly winds bring in a heavy swell.

There is anchorage for small vessels, soft bottom, on the southern side of a cove at the NW. part of the bay. The village of Flamingo stands in a small bight on the west side of the bay. Westward of Flamingo bay are Fortaleza and Mar Virado bays.

Coast.—From Flamingo bay the coast trends to the SW. for about 20 miles to Arpour point, has several indentations, backed by high land, and with the north side of São Sebastião island forms a deep bay open to the eastward, named Barra das Canavieras.

Victoria island.—Eastward of São Sebastião island is that of Victoria. Southward of the west end of Victoria are two small islets surrounded by a reef which extends about 2 miles SSW. from the island.

The Busios islets lie 11 miles to the southward of Porcos island. The passage between these islands and the shore, guarding against the reef southward of Victoria, is free from danger.

São Sebastião island, in form quadrilateral, is about 14 miles in extent, and its summit, 4,265 feet high, is as high as the mountains of the mainland, from which it is separated by a channel from about one to 3 miles in breadth. The island may be seen in clear weather from a distance of 45 miles; it is covered with wood nearly to its summit, and its shores are steep to; it has several waterfalls and some scattered houses.

Bank.—About 2½ miles northeastward of Canavieras point, the north point of island, H. M. S. *Forward* found depths of 5 and 5½ fathoms, for the distance of one mile.

Villa Nova da Princeza, off which is the usual anchorage, stands on the western side of the island. The town consists of a couple of streets and a few detached houses, with a church built on the rising ground at the back of it; a dilapidated fort stands near the beach. The old town of São Sebastião is on the mainland at 2½ miles to the SW. of Princeza.

Telegraph.—There is telegraphic communication with Santos and Rio de Janeiro.

Sao Sebastião channel.—The channel of São Sebastião affords a roomy and safe anchorage for the largest vessels, and there is almost always smooth water in it. It runs to the southward along the island side for about 5 miles, when it trends to the SW. The west side of the channel is bordered by a bank, having over it from one to 3 fathoms water. From Arpour point, the west termination of the channel to the northward, the bank extends about 2 miles towards Canavieras, the east point, leaving a channel one mile in with, with a depth of about 12 fathoms. The bank terminates at the point one mile southward of the town of São Sebastião.

Vessels bound into São Sebastião channel from the northward, when at ½ mile westward of the Armação (village) at the NW. part of the island, should steer along the island side at a distance of about ½ mile in from 10 to 20 fathoms. The southern channel may also be used if convenient, so that a vessel may leave by either channel according to the wind. The winds at São Sebastião during the day blow nearly always from NNE. or SSW., following the direction of the channel, but frequently interrupted by calms. At night the land wind is variable.

Supplies.—There are several watering places at São Sebastião; one of the best is between Villa Nova da Princeza and the Armacao; the water is good and easily obtained. Cattle, poultry, spirits, and fruit may be procured at a moderate price. On all the coast of the mainland firewood is abundant. Fishing is rarely productive, but the fish are of a good quality.

Tides.—It is high water full and change at São Sebastião at 2 h.; springs rise 4 feet. The tides are irregular. The current follows the direction of the winds, and within the channel runs nearly one mile an hour, and occasionally 2 miles an hour.

Coast.—From the southern entrance of São Sebastião channel the coast formed by the high land trends in a westerly and southerly direction, about 50 miles to Moela islet, near the east side of entrance to Santos bay. In the bay thus formed at 17½ miles from Sebastião point, the west extreme of that island, and 5¾ miles from the shore, is Monte do Trigo, or Corn Stack island, 984 feet high, nearly conical and wooded to the summit. At 2 or 3 miles around it, and at the same distance from the coast, the depths are from 10 to 16 fathoms, muddy bottom.

Alcatrasses islands.—At the distance of 15 miles southeasterly from Monte do Trigo is a barren group named Alcatrasses or Cormorant isles, the largest of which may be seen for a distance of 30 miles. At 2 miles northwestward of the largest islet is Paredon islet, and at the same distance to the NE. are two or three others. These latter islets are low. A patch of 5¼ fathoms lies about 3 miles SW. of the large islet. It is not prudent to approach this group nearer than 4 or 5 miles, as the bottom in the vicinity is stated to be foul and the currents uncertain.

Santos harbor is formed on the east by the island of São Amaro, which is separated from the main by the small rio Bertioga, navigable for boats, and on the west by Santos island. The entrance to the Bertioga is northward of São Amaro, and named Barra de Bertioga. Manduba point, the south end of São Amaro island, forms with Taypu point, at nearly 7 miles west of it, the extremes of Santos bay. The bay is about 3½ miles deep, has depths from 4 to 8 fathoms, and on the east side is the principal entrance to the harbor, off which vessels may lie sheltered from all winds except those from southwestward.

The shore ends of the two submarine cables are landed in the bay.

The bay of Santos is easily known, Taypu point being the westernmost high coast land for some distance, the coast immediately west of it being low and flat to the base of the mountains for about 10 miles inland; while all Santos bay is surrounded by a succession of steep hills of moderate height, broken here and there, chiefly at the north side of the bay, into small low beaches.

Santos.—The town of Santos stands on the west and south sides of the harbor, on the NE. corner of the island of Santos, and is the principal seaport of the coffee-growing province of São Paulo. It is well built, has two churches, convents, hospitals, and building slips, with a population of about 35,000. Its situation is unhealthy; the country around is low, woody, and frequently deluged with rain. There is a railway between Santos and São Paulo, distant about 37 miles, and to Rio de Janeiro; also a steamer to Rio every five days.

Santos is in telegraphic communication with Rio both overland and submarine, and there is also a cable to Montevideo.

The principal exports are coffee, cotton, and hides; the amount is second only to Rio Janeiro.

The entrance to the harbor is commanded by a fort on either side. From Barra fort, a large white building on the south side, the harbor extends northeastward about a mile, when it trends to north and west for 4 miles to the anchorage off the town. The harbor is narrow, with from 4 to 11 fathoms. On the eastern shore, close up to the town, is a small fort (hidden by the trees), on Itapema point.

The United States is represented by a consul and vice-consul.

Rock.—About 1¼ miles south of the town lies a rock with a depth of 16 feet, and 4¾ to 6½ fathoms between it and the shore. A red buoy marks the position of the rock.

Buoys.*—Two buoys, with staff and ball, mark the entrance to Santos harbor, namely, one on the south side, 600 yards westward of fort Barra, and one on the north side marking the edge of the bank westward of Trinxheira point. These buoys are liable to shift during southwesterly gales, and are therefore not to be depended on.

Light.—On Moela (Gizzard) islet, a mile SE. of Manduba point, is a white tower, 40 feet high, which exhibits at the heigtht of 334 feet above high water a *fixed* white light, which may be seen in clear weather from a distance of 20 miles. It is reported that the light can only be seen from 12 to 14 miles.

A small light is said to be shown from fort Barra Grande, on the south side of entrance to Santos harbor.

Anchorage.—Large vessels can now lie alongside the wharves at Santos; and there is good anchorage off it in 3 to 5 fathoms. Vessels of war usually anchor more to the eastward, the sea breeze being stronger there. A mud-bank, facing the northern shore between Itapema point and fort Ilha de Carvalho to the northwestward, considerably narrows the channel and anchorage.

---

* Information has been received that the buoyage of Santos harbor is not to be depended on, and mariners are warned that during the continuance of hostilities in Brazil it is probable that aids to navigation in general can not be entirely depended on in that state.

Supplies.—At Santos all necessary supplies may be procured in abundance. Water is purchased, or boats may be sent 5 or 6 miles up the river for it, where there is a deep, clear pool of fresh water. For washing purposes it may be obtained from hydrants close to the shore.

Coal.—The São Paulo Railway company will generally supply a ship-of-war with a small quantity of coal. There is usually about 1,000 tons in stock.

Port charges.—Discharging at customhouse wharf, gratis; at private wharf, 7 to 10 milreis per diem; clearance in ballast, 150 reis per ton; with cargo, 300 reis per ton; hospital dues, 640 reis for each seaman and 4,000 for vessel. Ballasts costs 2,000 reis per ton. Expenses of a vessel of 400 tons, with general cargo in and ballast out, about 600 milreis.

Pilots.—Vessels requiring pilots can obtain them from the village of Barra by making the usual signal.

Tides.—It is high water, full and change, at 2h. 50m., springs rise 5 feet. The tides are strong, particularly the ebb.

Directions.—After passing Moela islet, about one mile distant, steer along the land until mont Serrat bears N. 3° E. (N. 6° E. mag.), when it may be steered for until the river entrance is well open bearing S. 87° E. (S. 84° E. mag.) Steer for the entrance on this bearing, passing close to the fort on south side, when the southern and eastern shore should be kept aboard until the inner of the two trees on the summit of North Outeirinhos is in line with the perpendicular rock on the face of South Outeirinhos, bearing N. 45° W. (N. 42° W. mag.); this mark will lead in the deepest water in this reach. When near to South Outeirinhos edge quickly to mid-channel to avoid the rock off it, and having passed the North Outeirinhos, steer with Itapema point a little on the starboard bow, pass moderately close, and then haul to northwestward to the anchorage off the town, in about 4¾ fathoms, with mont Serrat bearing S. 54° W. (S. 57° W. mag.)

Lage de Santos, situated 16 miles S. 17° E. (S. 14° E. mag.) of Moela lighthouse, is a barren white islet 70 feet high; and ESE. of it, about 1½ miles, is a reef of rocks about 10 feet high; also on the western side of the lage, ¾ mile distant, there is a rocky shoal separated from it by a deep passage. Between it and Santos the depths are from 15 to 22 fathoms, sand, mud, and broken shell.

Medeiros rock, originally reported as awash in 1811, in latitude 25° 41′ S., longitude 44° 48′ W. (southeastward of Santos), and said to have been sighted about 10 miles westward of this position in 1877, was again reported in 1880 as having 6 or 8 feet on it in latitude 25° 26′ S., longitude 44° 21′ W., or about 29 miles northeastward of the original position. It was searched for unsuccessfully by U. S. S. *Alba-*

tross in 1887. It is not placed on the charts, but caution should be exercised when in this vicinity.

Coast.—The coast from Taypu point, the west extreme of Santos bay, trends in a southwesterly direction 22 miles to the village of Conceição. The shore is generally low, backed by high mountains at the distance of 12 or 15 miles inland, which here and there branches toward the sea, and appear from a distance like islands. At the distance of 12 miles S. 20° W. (S. 23° W. mag.) of Taypu point is a small bank with only 9 feet of water on it, lying in the way of vessels from the southward bound into Santos. It was discovered by the Brazilian man-of-war *Don Pedro Seconda*, and seen to break by the master of S. S. *Plato* in 1884. Conceição stands on rising ground near the beach; thence a low sandy shore continues to the SW. for 14 miles to the heights and creek of Piruibe, where it takes a more southerly turn for about 5 miles to Guarau point and islets.

From Guarau point the shore trends again to the SW., and at the distance of 11 miles is Jurea point, with the bar of the rio Una between. At 14 miles more to the SW. is the bar of the rio Iguapé; and about 4 miles farther on is Capara bar, the entrance to the Mar Pequena de Iguapé, which admits boats into that sea. Temporary anchorage will be found at any convenient distance from the shore.

Lage de Conceição situated 7 miles S. 37° E. (S. 34° E. mag.) of the village of Conceição, and 15 miles northward of Queimada Grande, is a small rock about 12 yards in extent and 16 feet above the sea, with 12 fathoms, mud and sand, at ¾ mile seaward of it. At 6½ miles S. 56° W. (S. 59° W. mag.) of the Lage de Conceição is a rock about 40 or 50 yards in extent, with 26 feet over it; the sea breaks on this rock during fresh winds from seaward.

The Queimada islets lie NW. and SE. 9 miles from each other. Queimada Pequena, about 9 miles from the coast and 10 miles S. 36° W. (S. 39° W. mag.) of the Lage of Conceição, is a small conical islet, thickly wooded and visible at a distance of 20 miles. Queimada Grande, 623 feet high, is said to be nearly 2 miles in length, north and south, with a reef extending from its northern end, and is visible from 30 to 35 miles. The islet is nearly barren, with its highest part to the SW. appearing round. From the southward and eastward it shows as two peaks of nearly equal height, and is a good mark for making Santos.

Mar Pequena (little sea) is a narrow lake or channel running parallel with the shore, from 4 miles southward of Iguapé bar to Cananea bay, a distance of about 30 miles. The town of Iguapé stands on the west bank at 4 miles from the entrance; the sea is divided at its SW. part by the Cananea island, and it has depths of 4 to 6 fathoms. La Praia, or beach of Iguapé, the island which forms the Mar Pequena, is a chain of low, sandy downs, interspersed with brushwood, and can be seen only from a short distance. It should, therefore, be approached with caution, and in foggy weather not nearer than 6 miles, where there is from 9 to 11 fathoms, sandy bottom.

Cananea bay, at the southern entrance to the Mar Pequena, is formed by an island southward of La Praia, the sandy island fronting Iguapé, and which is separated from the main to the westward by a rivulet named Ararupira.

The islet Bom Abrigo, which lies at the entrance, is high, covered with trees, and its two extremes are more elevated than the center. There are several shoals on which the sea breaks northward of it, at the entrance to Cananea bay, and a smaller islet lies on its south side. At 2 miles eastward are depths of 11 and 12 fathoms, sand. A town, where vessels are built, stands about 7 miles northwestward of Bom Abrigo.

Light.—On the southern part of Bom Abrigo islet stands a white lighthouse 40 feet high, from which, at an elevation of 505 feet above the sea, is exhibited a *flashing* light, showing alternately *two white flashes* and *one red flash*, with intervals of *fifteen* seconds between flashes. The light should be visible in clear weather from a distance of 15 miles.

Anchorage.—The bay is large and affords well sheltered anchorage. The entrance will be known by mount Cardoz, 2,690 feet high, the highest part of the island, forming Cananea bay; notwithstanding its height, the fogs that prevail on this part of the coast during the southern monsoon prevent the land being seen. H. M. S. *Mallard* crossed Cananea River bar a little before high water, in 1879, and found the least depth to be 15 feet; the shoal part of the bar was about ¼ mile across, when the water deepened to 7 and 12 fathoms. The town of Cananea is 6 miles distant, and port Colonia, visited by the *Mallard*, is about 12 or 14 miles from the anchorage off Bom Abrigo.

Competent pilots, which are necessary for crossing the bar, can only be obtained at Cananea.

There is a well protected anchorage westward of Bom Abrigo island in 4 fathoms, sand, about 600 yards from the island shore. The best entrance to this anchorage is southward of Bom Abrigo, the south extreme of which may be rounded in 7 fathoms water at a distance of 400 yards. This is the best place to wait for a pilot, if bound to Cananea bay. The northern channel is generally used, but the southern is deeper.

Coast.—The coast from Cananea point, on the south side of entrance to Cananea bay, continues low and sandy to the SW. for about 30 miles, to the entrance of Paranagua bay. A small islet and reef lie off Cananea point. At about 8 miles SSW. of the point and nearly opposite the bar of Ararupira is Castilho islet. The islet takes its name from a ridge rising from the center which, at a distance, resembles a castle. At 7 miles SW. by S. of Castilho is Figueira islet. Both these islets are nearly barren. They may be rounded closely, and at one mile seaward there are from 10 to 15 fathoms, fine sand.

The water which issues from the bay of Paranagua carries with it alluvial deposits which diminish considerably the depths outside, but not so much as to affect navigation. At 6 miles from the entrance the depths are from 5 to 8 fathoms, gray sand and mud.

Paranagua bay is a deep inlet or gulf trending westward and northward from 10 to 15 miles. It is surrounded by forests and receives the waters of many small rivers. The entrance is sheltered and divided into two channels by ilha do Mel (honey), a low island on which are several hummocks, appearing at a distance of 7 or 8 miles like islets.

Islets.—Banks.—Eastward of ilha do Mel are three islets covered with palm trees, named Palmas, about 130 feet high, with several rocks one mile west-northwestward. Connected with Palmas islets is a triangular-shaped bank, named Barra de Paranagua, which extends from the islets 3¾ miles seaward; its south extreme is usually marked by a buoy.

A reef is reported to lie about ¼ mile northward of Conchas point, with deeper water between it and the shore.

At the distance of 1,200 yards N. 86° E. (N. 87° E. mag.) of the fort, on ilha do Mel, is a circular patch of rocks about 400 yards in diameter named Balcas, some of which cover at high water. A spit has extended 400 yards in a NW. direction from Balcas rocks, and has not more than 16 feet over it.

At 800 yards N. 7° W. (N. 6° W. mag.) of Balcas is Coxoes, a small island surrounded by a reef.

A rock, with a depth of 7 feet over it, lies 400 yards S. 69° E. (S. 68° E. mag.) of Ilha do Mel fort; and about 200 yards southward of an islet, 6 feet high, situated 200 yards off the fort.

The island of Raza da Cotinga, about 3¼ miles in length east and west, and one mile in breadth, with Cotinga island running parallel on its northwestern part, lies on the south of Paranagua bay, at about ½ mile from the main, and leaving a space between them and ilha do Mel of about 1¼ miles.

Buoys.—A buoy with flag marks the reef lying about 800 yards N. 67° E. (N. 68° E. mag.) of Ilha do Mel fort.

A black buoy marks the entrance to North channel with Bixo point in line with the summit of Cobras island N. 82° W. (N. 81° W. mag.) and Figueira island N. 41° E. (N. 42° E. mag.). The NE. buoy of Paranagua bank is white, with 30 feet water close to it, and it should be left on the port hand when entering. A perch surmounted by a ball is situated 2½ miles N. 36° E. (N. 37° E. mag.) of the pilot flagstaff.

A red buoy with a vane marks the SW. extreme of Paranagua bank.

A red buoy lies ¼ mile N. 32° W. (N. 31° W. mag.) of Balcas (Panema) rock.

A reef, awash at low water, lying 600 yards SE. of Coxoes island, is marked by a stake beacon.

In December, 1890, the buoys marking Balcas rocks and Paranagua bar had disappeared.

Channels.—On either side of Barra de Paranagua there is a channel into the bay; the north channel between Barra de Paranagua and Barra Superaguy, at about ¾ mile north of it, has a depth near the entrance of 16 feet at low water; there is generally a heavy swell in it and at times the sea breaks.

The south channel, ½ mile wide, is the only one used. It is formed between the SW. side of Barra de Paranagua and a bank extending SE. of ilha do Mel; the depths in it are from 8 to 3 fathoms. The bar, which was stated to be shoaling in 1871, had in 1889 a depth of 23 feet at high water.

Galheta islet lies in the entrance westward of ilha do Mel, and the channel being dry at low water is not navigable.

Town.—The town of Paranagua, which is of some importance, stands on the mainland southward of the west end of Cotinga island, and on the west side of a small creek, which has from 6 to 12 feet water. It has a criminal court, a customhouse, a hospital, and a population of 8,000.

Shoals.—A perch marks the northernmost of two shoals off Cruz point, the west extreme of Cotinga island; these shoals cover at one-third flood. Three red buoys mark the west side of the channel between Texeira island and Clemente point, entrance to Antonina bay. The two patches hitherto charted 400 yards northward of Texeira island are stated to be situated the same distance WSW. of the north point of that island.

Lights.—On Conchas point, the east point of ilha do Mel, stands a white iron lighthouse 69 feet high, which exhibits, at an elevation of 197 feet above the sea, a *fixed* white light, visible in clear weather from a distance of 18 miles. There is a pilot's flagstaff at the lighthouse.

From fort Santa Cruz is exhibited at an elevation of 52 feet above the sea a *fixed red* light, visible in clear weather from a distance of 6 miles.

Porto Pedro.—The village of Porto Pedro, situated on the shore at about one mile westward of the town of Paranagua, is the principal station for the railway goods traffic between Paranagua and Curitiba. There are two wooden piers for vessels to lie alongside; the western has 13 feet water at its head, and a crane for unloading.

Coal.—The railway company have a coal depot at Porto Pedro. The price in 1889 was $9 per ton.

Signal station.—There is a signal station on the hill near the center of Cotinga island, about 1½ miles eastward of Paranagua town.

Port charges.—The port charges and expenses of loading and unloading are payable by the vessel unless otherwise agreed. Pilotage, 50 to 100 milreis. Expenses of a vessel of 400 tons loading here are 800 milreis.

Anchorage.—Merchant vessels anchor near the town of Paranagua in a creek which admits vessels of 500 tons. A mud flat extends from the main across the creek, leaving only a narrow channel which is marked by beacons. Small craft get close up to the town.

Pilots are to be obtained at Conchas point.

Supplies.—There is a good and well supplied market; meat, fish, and vegetables can be procured at reasonable prices.

Tides.—It is high water, full and change, at Paranagua at about 3h.; springs rise 6½ feet. The tides are influenced by the prevailing winds and are very irregular; in the entrance the ebb runs at the rate of 2½ to 3 miles an hour; the flood tide does not exceed one mile an hour.

Directions.—Approaching Paranagua bay from the eastward, when 30 miles distant, three peaks, not far apart from each other, will be sighted nearly ahead; and on a nearer approach the round islet of Figueira will be seen, also the hillocks on ilha do Mel and Palmas islets, surmounted by trees. Shoal water extends from 4 to 5 miles off the entrance. Vessels bound into the south channel should not shoal to less than 6½ fathoms until the lighthouse on Conchas point bears N. 46° W. (N. 45° W. mag.). This course will lead up to the red buoy near the south corner of Barra de Paranagua.

With SE. winds, the entrance presents a continuous line of breakers, and the pilots seldom board until the vessel arrives within the bar; attention, however, should be paid to the signals which will be made from the pilot boat, as she will indicate the proper track by inclining a flag either to one side or the other.

Pass close to the southward of the red buoy on the south end of Barra de Paranagua; thence a course N. 26° W. (N. 25° W. mag.) will lead across the bar in 23 feet at high water: passing about ⅛ mile northeastward of Conchas point, in 8 fathoms, thence from Conchas point to fort Santa Cruz. After passing Conchas point (avoiding the shoal reported to lie northward of the point), pass about 600 or 800 yards from the fort, between the fort islet, which has 10 fathoms close to, and Balcas rocks partly covered at high water. After passing Fort islet keep about 800 yards distant from ilha do Mel; when abreast the west point of this island, steer for the north part of Cotinga island, passing about 600 to 800 yards north of it.

Caution.—It is not advisable to attempt either of these channels without local knowledge, as the buoys can not be depended on.

Coast.—At about 23 miles southwestward of ilha do Mel lies the entrance to Guaratuba bay. The coast between is stated to be bordered by a bank extending 4 or 5 miles seaward, over which boats only can pass. At about 10 miles southward of ilha do Mel, and 6½ from the shore, are the three Cural islets, the largest of which is 64 feet high; and at 5 miles more to the southward are the three Itacolomi islets, 21 feet high, and nearly off Guaratuba bar. At from one to 2 miles eastward the depths are 9 to 11 fathoms, sand and mud.

At 18 miles south from Guaratuba bar is cape João Diaz, the north extreme of São Francisco island, high, bold, and easily known, and which forms the southern point of entrance to the river of the same name; the shore between is flat and the surrounding country of little elevation, but distinguished by some remarkable hills; morro Marumby in the serra de Prata range being 4,691 feet high, and at some miles in the interior by the serras de Maratuba, a chain of high rugged mountains.

At 2 miles eastward of cape João Diaz are the Graça islets, the largest of which, ilha do Paz, is 223 feet above the sea, and at ¾ mile NE. of the cape is a sunken rock with 15 feet water over it. These islets and rocks extend north and south over a space of 2 miles, with 4 to 8 fathoms water between them and the coast. The northernmost islet is on the parallel of cape João Diaz.

Guaratuba bay is about 7 miles in length, east and west, by 3 in width, and is accessible for vessels of 8 feet draft. Several small rivers flow into the bay. The village of Guaratuba is about 2 miles within the south point of the entrance. The vicinity has been noted for its fisheries.

Rio São Francisco do Sul rises about 42 miles in the interior, is augmented by various tributaries, and empties into the sea through two mouths formed by an island of the same name. The Araquary or southern channel, with one fathom water, is dangerous, being obstructed by a shifting sandbank over which the sea breaks with violence.

The northern channel, more than a mile in breath, named Bobitanga or São Francisco, is navigable for moderate size vessels. The bar has from 16 to 20 feet water on it, the shallowest part being towards its south end, and extends from about one mile eastward of cape João Diaz, in a northerly direction, for more than 2 miles across the mouth of the river, leaving a channel between its north end and the bank bordering the shore with 22 feet water.

Three-quarters of a mile NE. of cape João Diaz, there is a sunken rock with 16 feet water on it.

The island of São Francisco is of a triangular form, about 18 miles in length in a north and south direction, and about 10 miles in breadth; it is generally flat, and watered by numerous streams. Cape João Diaz, the north point of the island, is 469 feet above the sea.

The morro Itamirim 558 feet high, is 1½ miles south of cape João Diaz, and is the highest land on this part of the coast north of Itapacarohy point.

Light.—From an iron lighthouse painted white, erected on cape João Diaz, is exhibited at an elevation of 311 feet above the sea, a *fixed* white light, visible between the bearings of N. 45° W. (N. 45° W. mag.), through south, and N. 45° E. (N. 45° E. mag.) from a distance of 12 miles in clear weather.

Town.—The town of São Francisco (Nossa Senhora da Graça) stands on the NW. side of the island about 8 miles from the bar. It is entirely without fortifications. On the banks of the river Saguasu about 12 miles from the town of São Francisco, is Colonia, a thriving German settlement numbering about 7,000 people; their principal trade is in wood, which they send to Montevideo and Buenos Aires.

Buoys.—A red buoy marks the outer edge of the shoal extending from Galhinas point, with that point east distant 1,400 yards.

A black buoy marks the shoal nearly a mile north of Cross point; and a red buoy the shoal between 800 and 1,000 yards NE. of Cross point.

A red buoy with ball is moored in 10 feet on the northern edge of Valois shoal, with the church bearing S. 32° E. (S. 32° E. mag.) nearly 800 yards.

A red buoy with ball, in 26 feet, lies on the western side of a 10-foot bank, with the church east distant 400 yards.

A similar buoy lies in 3½ feet, with the church N. 56° E. (N. 56° E. mag.) nearly 1,200 yards.

Caution.—Too much reliance must not be placed upon the buoys.

Beacons.—Red beacons mark the banks dry at low water situated, respectively, westward one mile; westward 870 yards, and S. 76° W. (S. 76° W. mag.) 900 yards from the church; also the one-fathom bank S. 59° W. (S. 59° W. mag.) 670 yards from the church.

Shoals.—A shoal with a depth of 12 feet is reported to lie S. 52° W. (S. 52° W. mag.) distant 400 yards from Cross point, but this position is doubtful.

A shoal with 3½ fathoms and 4 to 5 fathoms close around, lies with Cross point bearing S. 68° E. (S. 68° E mag.) distant 533 yards and Pedra point S. 34° E. (S. 34° E. mag.) distance 650 yards.

A sunken rock is reported with a depth of 6 feet on it at low water and 4½ to 5 fathoms around, lying with Cross point bearing S. 16° E. (S. 16° E. mag.), and Peroba point N. 83° E. (N. 83° E. mag.).

Anchorage.—The best anchorage for large vessels is in 9 fathoms, with Pedras point N. 75° E. (N. 75° E. mag.) and the church S. 57° E. (S. 57° E. mag.). Smaller vessels may approach the shore to 5 fathoms, with Pedras point N. 45° E. (N. 45° E. mag.) and the church S. 57° E. (S. 57° E. mag.).

Tides.—It is high water, full and change, at São Francisco at 2h. 30m. a.m.; springs rise 7 feet, and neaps 5 feet. At springs, the stream from the river runs from 3 to 4 miles an hour, and is only overcome by the strength of the flood, soon after resuming its course; this is called half tides (meias marés). The north and NW. winds cause the water to fall, and those from the south and SE. raise it, in proportion to the force of the wind, from 6 to 9 feet above the main level, which inundates the two banks at the entrance to the river.

Winds.—The land winds blow from SW. to WSW. from March to September, and during the remainder of the year from WNW. to NW. The winds from NE., SW., and west raise a sea, but it goes down as the wind dies away.

Directions.—The rio São Francisco should be entered with caution, and the sea on the bar should be taken into consideration. When the wind and tide are contrary, the sea is heavy even in fine weather, and inside the bar, in from 8 to 12 fathoms water, it is generally worse. It is therefore always prudent, before entering the river, when it is contrary to the wind, to wait for change of tide so as to have smooth water.

Steer in with cape João Diaz bearing about S. 11° W. (S. 11° W. mag.), keep the lead going, and when at the distance of 3 miles from the cape, steer west (west mag.) to bring its east extreme in line with the morro da Enciada, the eastern point of the island, bearing S. 23° E. (S. 23° E. mag.); then steer for it, which leads in the best water (21 feet), until a long mile from the cape, or the river is well open; but the north point of entrance should not be brought westward of S. 65° W. (S. 65° W. mag.) until well inside the cape, in order to avoid the shoal water extending ¾ mile northward of the cape. Then keep in mid-channel and the water will gradually deepen to 8 and 11 fathoms; and a vessel will carry the latter depth past a shoal extending seaward from the north point of entrance, and on which the sea breaks heavily

A vessel of light draft may cross the bar, giving cape João Diaz a berth of ½ mile.

After passing the north point and breakers, at a convenient distance, a group of islets will be visible. Steer along the NW. shore with the islets ahead until the town of São Francisco is seen; then steer toward and anchor off it as previously directed.

Vessels working should avoid the detached rock 800 yards NE. of Ovaringa islet, and about ¼ mile from the north shore, and tack immediately the lead indicates hard bottom. On the SE. of the channel is Coroa Grande flat, fronting the mouth of the Sacco de Peroba, and which dries at low water. During the sea breeze there is a heavy surf on it, and the stream out of the river sets towards it; in working, the north shore should be kept aboard.

Outer anchorage.—A stranger desirous of communicating with the town of São Francisco, and not wishing to cross the bar, will find anchorage with good holding ground between São Francisco and the Graça islets, well sheltered from all winds but those from the north. The wind seldom blows hard from the northward; but a gale often occurs from SSW. or south and veers to SE. A vessel at anchor near the entrance to rio São Francisco would be on a lee shore in a SE. gale, and from the trend of the land unable to obtain an offing; hence the value of this anchorage.

From the northward pass ¼ mile inside the northern islets and steer towards the morro Itamirim, with the other islets broad on the port bow until about halfway through; then anchor in 5 or 6 fathoms, sand, or, if convenient, more to the northward. From the southward pass between the south islet of the Graça group, lying just northward of the morro da Enciada, and the islet of Paz, the largest of the group next it. The channel is about a mile in breadth, with 10 fathoms water, shoaling to 5 or 6 fathoms as a vessel advances to the northward.

Pilots.—Vessels anchor in the outer anchorage to await a favorable opportunity to enter the river; and here a pilot may be obtained.

Coast.—At 12 miles south of the Graça islets is another group, named the Tamboretes, at about 2 miles from the shore. At 5 miles SSW. of the latter islets are the Remedios islets, lying east of the entrance to the Araquary or southern channel of São Francisco, and between 2 and 3 miles to the southward of them are Lobos and Tapitanga islets. All these islets are covered with trees. From the Araquary channel the low shore trends in a southerly direction for 18 miles, thence eastward for about 4 miles to Jurubatuba point. About 8 miles southward of the Araquary is Itapucu bar, and 6 miles beyond is Itacolomi (Pedras) island, 108 feet high, and 3½ miles from the shore.

The land between Itapacarohy point and Santa Catharina island is high, covered with wood, and, like that in the neighborhood of that island, appears in irregular mountains and valleys, some of which extend to the coast, and can be seen at a distance of 45 miles. The shore forms several bays, with small rivers running into them. Tijucas bay, NW. of Santa Catharina, affords good anchorage.

Volage bank, of 14 fathoms, is situated about 25 miles eastward of Itapacarohy bay. Its center is in about latitude 26° 44′ S., longitude 48° 7′ W.

Itapacarohy bay, to the westward of Jurubatuba point, is a safe anchorage, with winds from SE. round by south to NW., in about 5 fathoms, mud, and good holding ground. Small vessels lie sheltered close in to the village, near some piles formerly a pier, when this was a great Armacao or whaling station. A disagreeable sea sets into the bay with NE. winds. The head of the bay is shallow, and from the village, along the beach towards Feya islet, are several reefs which do not show with smooth water. Anchorage will also be found on the SW. side of Feya islet, and rather better with some winds than in the bay.

Feya islet is 229 feet high, and has a reef extending off about ½ mile to the northeastward. The islet lies 1¼ miles off the west point of Itapacarohy bay.

A dangerous rock, which always breaks, with 5 to 7 fathoms close to and 6 to 8 fathoms between it and the shore, lies with Itapacarohy point bearing S. 29° W. (S. 29° W. mag.) and João Diaz point S. 74° W. (S. 74° W. mag.) nearly one mile. Supplies can be procured at the village.

Itajahi river.—The entrance to this river is 6 miles southward of Itapacarohy point, between Cabecudo point on the south side and a low neck of land on the north, with a spit extending to the southward, rendering the channel narrow and difficult. The spit is marked by a buoy.

The depth of water in 1883, owing to recent inundations, was only sufficient for small vessels to cross the bar.

Anchorage.—The best anchorage is abreast of the church, a little above the town, where the breadth between the 3-fathom lines of soundings is about one mile; the bottom composed of sand and clay.

Tides.—During the three days' stay of the *Albatross* the surface stream was always running out, with a maximum velocity of 1½ knots, checked during the flood. It is of high water, full and change, at 2 h., rise 2⅝ feet.

Supplies, also several kinds of timber, can be obtained. Itajahi is in telegraphic communication with Nossa Senhora do Desterro, on Santa Catharina island, thence by submarine cable to Rio, etc.

Cambriu, like most of the anchorages on this part of the coast, is open to the northeastward, but sheltered from all other winds; the bottom is a mixture of sand and mud. The river of the same name which flows into the SE. corner of the bay is narrow, the bar shallow, and can be crossed only by small coasters. A dangerous patch of sunken rocks lies 300 yards north of Cambriu point, which is a prominent high bluff. With smooth water, the sea seldom breaks on it.

Porto Bello bay, to the westward of Porto Bello point, about 16 miles northward of Sta. Catharina island, affords shelter from nearly all winds for vessels of any size. Small vessels can enter the little bay southward of João de Cunha island.

This is one of the principal places for supplying the market at Sta. Catharina, and vessels of the squadron could procure supplies here very much cheaper than at that place.

There is good anchorage in 9 fathoms, blue marl, with mount Lobos, open west of João de Cunha island S. 22° W. (S. 22° W. mag.) and Porto Bello point N. 67° E. (N. 67° E. mag.).

Tijucas bay, just south of Porto Bello bay, is about 5 miles wide between Zimbos and Ganchos points. Zimbos bay, in the NE. part, affords shelter, in 4 fathoms, from northerly winds.

Cruz rocks lie about ½ mile off Zimbos point.

Ganchos bay, in the SW. part of Tijucas bay, affords good anchorage, and water, fresh beef, and stock may be procured from the village. It will be easily known, as it lies under the high sugarloaf peak named mount Ganchos, 2,000 feet high. Small vessels may anchor here in 3½ fathoms, mud. In entering or leaving this bay care should be taken to give a good berth to Ganchos point, as a reef of rocks extends ½ mile to the northward, on which the sea breaks only at times.

Arvoredo islet.—There are several small islets northward of Santa Catharina; the largest is that of Arvoredo, at the distance of 6 miles; it is high and wooded, with an islet, named Desérta, 1½ miles from its eastern side, and is a good mark for this part of the coast. There is anchorage in the small bay on the SW. side of the island in 11 fathoms, mud.

Light.—From a lighthouse 47 feet high, on the SE. point of Arvoredo islet, is exhibited a *fixed* and flashing red and white light alternately *every two minutes;* visible through an arc of 291° or between the bearings of S. 12° E. (S. 12° E. mag.) through west, and S. 81° E. (S. 81° E. mag.). It is elevated 295 feet above the sea, and should be visible in clear weather from a distance of 23 miles.

São Pedro islets, 3 miles WNW. of Arvoredo, and between it and the north point of Tijucas bay, are two rocky islets, with a breaker ½ mile S. 56° W. (S. 56° N. mag.) of them; and about 4 miles northward, and nearly the same distance from the shore, are the Pedras dos Galés, remarkable by long white streaks on its steep side, as well as by the two rocks which lie off its NE. end. Iris rock, with 14 feet water, lies with the north extreme of Pedras dos Galés bearing N. 62° E. (N. 62° E. mag.) and Bombas point N. 11° W. (N. 11° W. mag.).

Arvoredo light is not seen in the vicinity of these islets.

The channels between these islets and rocks are safe, the depths varying from about 8 to 18 fathoms, over ooze and gray sand.

Santa Catharina island, about 8 miles south of Tijucas bay, is separated by a narrow channel from the mainland; it is about 29 miles in length, in a N. by E. and S. by W. direction, and 10 miles across its north end. It is high, with its greatest elevation about 2,000 feet near the south end, and on approaching from the eastward appears much intersected by deep valleys; it may be seen from a distance of 45 miles; the mountains of the mainland are higher, particularly the morro Camborella, a branch of the eastern Cordillera. On the eastern side near the shore is a lagoon, which has an entrance from the sea, 11 miles from the northern extremity of the island; it separates the mountains and forms a conspicuous opening.

The island is fertile, and produces farina, maize, sugar, cotton, coffee, etc., and a variety of fruit. Palm trees may be seen in every direction. The climate is considered the most healthy on the seaboard of Brazil; it has always been remarkably free from epidemics. About four or five hour's ride from the capital are hot springs, the temperature being about 100° F.; they are much frequented by people from various parts of Brazil from November to March.

Rapa point.—A reef is reported to extend off Rapa point, the north extremity of Sta. Catharina island.

Islets.—The eastern coast is clear of danger and may be approached at a prudent distance. There are several small islets off it, which may be seen at a distance of 9 miles; these are the North Moleques, the Badejo, and the two Aranhas at the NE. end of the island. Foul ground is reported off North Moleques, and it is therefore advisable not to round too closely. Isle Xavia, having a flat summit, 164 feet in height, with two small islets westward of it, lies off the middle of the island, 3 miles southward of the lagoon entrance; and about 6½ miles southwestward of Xavia is Campexe isle, westward of which anchorage will be found with southerly winds. The submarine electric cables are landed on the island nearly abreast of Campexe isle. South Moleques, 360 feet high, and Little Moleques are large white rocks, lying near each other in a NE. and SW. direction; when seen from the SE. they appear steep and conspicuous. Between these rocks and the Tres Irmãos, westward of them, there is a depth of 15 fathoms.

Nossa Senhora do Desterro.—The town of Nossa Senhora do Desterro, the capital, stands on the west side of the island, about 15 miles within the northern entrance of the strait. The bay, on the side of a gradually sloping hill, faces the SW. and has a pleasing appearance from the anchorage. Here is a cathedral, and on the west side of the town is a large hospital. The population of the island is about 140,000 and that of the town about 5,000.

The anchorage off the town may be approached either round the north or south end of the island, as convenient. There is a depth of 7 feet at the end of the wooden landing mole.

Supplies.—The market place is on the south side of a large square opposite the cathedral, and is well supplied. There are several watering places; the best water is procured near the village of San Antonio, 5 miles northward of the town; there is a stream of excellent water in the little bay ½ mile west of Anhatomirim islet on the main, and where supplies may also be procured; good spring water may also be obtained at about ¼ mile north of Ilhota point. Firewood may be obtained by cutting it at no great distance from the beach. Most kinds of repairs may be done here, and there is good timber of various qualities.

The island has little or no foreign trade, but is visited occasionally by vessels requiring supplies and repairs. If supplies only are required, and a vessel draws 11 feet and upward, she is not required to proceed to the town. The port and other charges on a vessel of 250 tons, entering with cargo and clearing in ballast, is about $65, and if clearing with cargo about $30 additional.

Coal.—From 400 to 600 tons are kept in stock at the town, and ships of war are supplied, by lighters, if it can be spared. Vessels of 19 feet draft can not approach the depot within a distance of 10 to 12 miles. Strong southerly winds blow at times between July and September, but would scarcely affect coaling off the town.

Telegraph.—The town is in connection by electric telegraph with Rio de Janeiro and other places on the mainland.

Pilots can be obtained at the small village near Anhatomirim islet and from Naufragados lighthouse; mariners visiting the place for the first time will do well to take one.

Anchorage.—A good position will be found in 3½ to 6 fathoms, with Raton Pequeno open of fort Santa Anna and with the cathedral bearing about N. 58° E. (N. 58° E. mag.). Caution must be used in anchoring, as there is a depth of 6 feet only, at 800 yards from the shore.

In the anchorage northward of Praia do Foro, there is reported to be 2 feet less water than is shown on the chart.

Lights.—On point dos Naufragados, south point of Santa Catharina island, from a circular building 140 feet above the sea is exhibited a *revolving* white light every 45 seconds; flashes, 6 seconds duration, visible in clear weather from a distance of 16 miles. Coming from the northward not visible until bearing N. 80° W. (N. 80° W. mag.).

Tides.—It is high water, full and change, at Anhatomirim islet at about 2h. 45m.; springs rise 6 feet and neaps 4½ feet. The tides are tolerably regular in Santa Catherina channel; they enter from the northward and southward at the same time, and meet off the town, where they also separate. The strength seldom exceeds ½ mile an hour, but near springs it sometimes runs 1½ miles. It is, however, somewhat influenced by the wind.

Winds.—The ordinary winds in the channel of Santa Catherina follow its direction either from the northward or southward; but they are seldom strong, and the squalls are not dangerous to vessels with good ground tackle. From March to September, being the winter, the winds in the vicinity of the island generally blow from south to WSW., sometimes strong and accompanied with rain, but these do not last more than two or three days.

Towards the month of October the winds draw to the eastward and northward, and the six following months of summer are the hottest in the year; squalls during the time are frequent from north round by east to west, and when during this season the wind is from the southeastward it is accompanied by much rain. In general the greatest quantity of rain falls during the months of August and September, but even at this period some years have been exempted.

They have here a proverb, "Pampero a la Missa," as the SW. winds set in once a week, and often on the Sunday. There is almost always a fresh breeze blowing from one side or the other of the town.

North channel.—The passage most frequented in approaching the north channel is between Rapa point and Arvoredo island. It is about 6 miles wide, clear of dangers, and either side may be approached to a prudent distance. Rapa point must not be approached too closely, as a reef of rocks is reported to lie off it. Grossa point, about 6 miles SW. by W. from Rapa, is foul and should not be approached nearer than ½ mile.

Anhatomirim islet, with the fort and white barracks of Santa Cruz, separated from the main by a narrow passage, lies west of Grossa point, and here the channel is about 2 miles wide, with depths of 4 to 5 fathoms; the deepest water is in the middle of the entrance.

Light.—On the south summit of Anhatomirim islet stands a lighthouse 27 feet high, from which at an elevation of 128 feet above high water is exhibited a *fixed* white light, visible in clear weather from a distance of 12 miles.

Anchorage.—Anchorage will be found as convenient and is everywhere safe, either northward or southward of Anhatomirim. At one mile south from the fort there is 4½ fathoms water, muddy bottom, but more shelter and better water will be found rather eastward. Here a vessel will be able to communicate with the village of San Miguel on the main, obtain water from the river of that name in the bay northward of it, and will be in a good position for visiting the town. The water is always smooth under shelter of the high land; the anchorage is open only to the NE., but the winds from that quarter are not dangerous.

At about 2¾ miles southward of Anhatomirim islet lies Raton Grande islet, and during northerly winds good anchorage may be obtained in 20 feet, soft mud, about ½ mile ENE. of the fort on its north end. At ¾ mile farther south lies Raton Pequeno. Raton river is navigable for boats at high water for 4 or 5 miles. Nearly all the produce of the northern part of the island is brought to the capital by this river. Off cape Quebra Cabaço on the main is a rocky flat named Ipatitinga do Norte, with 4 feet on it at low water.

During the spring tides there is never more than 12 feet water over the flats in the channel; the mud, however, is soft for a depth of about 4 feet. No damage will occur from grounding, but considerable delay may take place.

Buoys and beacons.—The Lage das Pescadinhas, at 2 miles SE. of Quebra Cabaço, is marked by a red buoy with flag. Guarazes rocks has, in addition to the beacon, a small white column with a black base on the west side of the reef.

Lage dos Tres Henriques, ¾ mile south of Lage das Pescadinhas, and Gurita rocks, at one mile farther south, are each marked by a red buoy.

Directions.—During northerly winds the land should be made to the northward, and with southerly winds to the southward, of the intended channel. A vessel of about 12 feet draft can navigate the north channel, and if bound for the anchorage of Nossa Senhora do Desterro, steer in for the entrance between Rapa point and Arvoredo island, or to the northward of the latter about midway between it and São Pedro. Having passed Rapa point, continue to the southwestward midway between Grossa point and Anhatomirim islet; then alter course to about S. 40° W. (S. 40° W. mag.), passing one mile westward of Raton Grande, and when the narrow part of the strait, which is about 400 yards in breadth and commanded on the east by fort Santa Anna, bears S. 10° E. (S. 10° E. mag.), steer for it; this will lead between the red buoy of Lage dos Tres Henriques and Guarazes beacons.

The water deepens considerably in the narrows, but shoals again after passing the fort. Gato isle should be passed at the distance of about 300 yards, when anchor as before directed.

South channel.—The southern entrance to the anchorage of Nossa Senhora dos Desterro is between point dos Naufragados, the SW. extreme of St. Catharina island, and Fort islet, the northernmost of three islets lying SSW. of it; the outer islets are the largest and named Papagaios, the southern of which is about one mile from the point. At nearly ⅔ mile eastward of point dos Naufragados is point dos Frayles, and beyond in the same direction are the Tres Irmãos islets, the outer one lying about 3 miles from the point.

Between Papagaios islets and point dos Frayles there is a bank on which the sea breaks. It is 1,200 yards long in a NW. and SE. direction and ¼ mile across, with 16 feet water. On either side of the bank there is a channel; the NE. channel is ¼ mile wide and has a depth of 24 feet; the SW. is 700 yards wide and has a depth of 29 feet.

Pinheira rock.—A small but dangerous rock on which the sea breaks with easterly winds lies directly in the fairway of the SW. channel, having a depth of 9 feet, with 6½ to 7½ fathoms close-to.

From the rock the northern extremity of Pinheira point bears S. 23° W. (S. 23° W. mag.), distant 1,400 yards. Point Pesqueiro Fundo, seen open eastward of the central Papagaios islet, leads eastward of Pinheira rock.

Cardos island, situated 1½ miles north of Naufragados point, has a shoal of 8 feet, mud, extending in a SE. by S. direction, nearly 400 yards from its south point. A beacon consisting of a white column with red stripes stands on Cardos island.

Buoys.—Two small red buoys are moored south of Cardos island; the channel lies between them. A small black buoy is moored off Caia Cangossu point, at 3½ miles north of Cardos island.

Lage do Cacao, at 3 miles north of Caia Cangossu, is marked by a red conical buoy; the depths have increased south of this danger.

A small black buoy is moored eastward of Largo island at ¾ mile north of Cacao.

A conical red buoy is moored ¼ mile N. 85° E. (N. 85° E. mag.) of Abrahão point, and a similar buoy on the edge of the shoals about one mile S. 22° E. (S. 22° E. mag.) of Abrahão buoy. Small buoys or beacons mark the rocks near the shore at Nossa Senhora do Desterro anchorage.

Directions.—A vessel entering the south channel should have a pilot, a leading wind, a rising tide, and not draw more than 15 feet water. From the eastward or southward, bring the center of the South Papagaios islet to bear N. 67° W. (N. 67° W. mag.) and steer with it on that bearing until Naufragados lighthouse bears north (north mag.); then skirt along the islets at about ¼ mile distant, passing at 200 yards from Fort islet. A vessel may also pass betwen Tres Irmãos islets and the main island, and then between the breaking middle bank and point dos Frayles, keeping the Santa Catherina side aboard. Between Fort islet and the lighthouse the water deepens to 11 fathoms, but shoals again rapidly in proceeding to the northward. After passing the lighthouse steer to the northward on the Santa Catharina side, and pass eastward or westward of Cardos island, avoiding the shoal extending southeastward of it.

When about 200 yards northward of Cardos island steer N. 64° W. (N. 64° W. mag.) until Anceada point bears N. 22° W. (N. 22° W. mag.), when it may be steered for until point Caia Cangossu bears N. 51° E. (N. 51° E. mag.); thence N. 5° E. (N. 5° E. mag.) until morro de Ribeirão bears N. 84° E. (N. 84° E. mag.), or nearly up to Cacao Shoal buoy; pass westward of that shoal, observing that the fort on North Papagaios islet, kept open west of Cardos isle until the cathedral opens west of Largo islet, leads clear of Cacao shoal.

From off Largo islet steer about north until Cascas islet bears west; then steer for the city and anchor as before directed. The South Itapitinga rocks, which lie east 3¼ miles from Cascas, are marked by a red buoy. A sailing vessel should not attempt to enter this channel with a scant wind and falling tide.

Coast.—The land between Santa Catharina and cape Santa Marta Grande is high and wooded. The mountains in the interior are covered with clouds when the wind is from the southward, but clear when the wind is from the NE.; they can easily be seen at a distance of 36 miles from the coast. At about 3 miles south of the lighthouse, on point dos Naufragados, is the high land forming Pinheira point, and at the same distance SE. of the latter is Coral islet, 230 feet high, about 1½ miles in extent, and covered with trees. At about 23 miles to the southward of Pinheira point is that of Batuba (Imbituba), with several small capes between, and 4 and 6 miles southeastward of Batuba are Araras and Tacami islets.

Batuba (Imbituba) bay.—Anchorage.—Northward of Batuba point there is good anchorage in Batuba bay in 6 fathoms, hard sand. The anchorage is sheltered from all winds except those between north and ESE. A berth may be taken in from 7 to 8 fathoms about 400 yards off shore, but the lighthouse should not be brought to the eastward of S. 51° E. (S. 51° E. mag.), as the water shoals rapidly inside that bearing. The bottom is rock in a NNW. direction from the point, and is said to extend to the opposite shore.

Winds from the NE. throw in a heavy sea, so that it is not advisable to remain during such winds.

Pier.—In fine weather vessels of 16 feet draft can lie alongside the pier. The railway runs on to the pier, receiving cargo direct from the vessels. Small craft can also obtain shelter south of Batuba point and westward of the South islet in 6 fathoms. This islet must not be rounded too closely, as rocks extend off about 200 yards.

Coal.—A railway connects Butuba with Tubarão, near which are extensive coal mines. The coal will be brought to the jetty for shipment, and it is proposed to build a breakwater from the point to protect the pier.

Supplies, such as eggs and poultry, can be obtained at moderate prices.

Light.—On Batuba point, from an iron standard 21 feet high, is exhibited, at an elevation of 69 feet, a *fixed* white light, visible seaward between the bearings of S. 45° E. (S. 45° E. mag.) and N. 45° W. (N. 45° W. mag.), and should be seen in clear weather from a distance of 10 miles. The keeper's dwelling, painted white, is the only house visible in the offing.

Barra da Lagoa.—From Batuba point a low flat tongue of land forming the Imaruy lagoon extends in a southwesterly direction for 16 miles to its entrance, at 5½ miles northward of which, and 2 miles from the shore, is Lobos isle. The bar is dangerous, and has from 6 to 10 feet over a breadth of 100 yards; but occasionally there is said to be only 4 feet of water on it. Vessels of 7 or 8 feet draft can sometimes enter the lagoon. Inside, on the south part of the tongue of land, about a mile northward of the bar, is the town of Barra da Lagoa, which carries on a small trade with Rio de Janeiro, and is in telegraphic communication with it. At the north end of the lagoon is the town of Villa Nova or Santa Anna.

Cape Santa Marta Grande. at about 6 miles southwestward of the entrance to Lagoa, is the termination of the line of mountains that backs the coast to the northward, and is remarkable by having on its summit several white places, which from a distance appear like houses; when bearing N. 34° W. (N. 34° W. mag.), about 10 or 12 miles distant, the cape appears like an island sloping to the SE., the lower part being sand.

Light.—On cape Santa Marta Grande stands a lighthouse 94 feet high, from which, at an elevation of 250 feet above the sea, is exhibited a *fixed and flashing* white light with a *red* sector (also fixed and flashing) over Campo Bon rock. The light shows *two flashes* in quick succession every 30 seconds, and should be seen in clear weather from a distance of 22 miles. The lighthouse consists of a square white tower above a square white keeper's dwelling.

Coast.—The coast from cape Santa Marta Grande trends southwestward for about 275 miles to rio Grande do Sul. The only known danger is the Campo Bon rock, stated to be situated about 12 miles S. 55° W. (S 55° W. mag.) of the cape. The white sandy shore is all along extremely low, variegated only by little hills and stunted bushes, and can be seen only in clear weather from aloft at a distance of 7 or 8 miles, and from the deck of a vessel at not more than 3 or 4 miles. The first part of it, as far south as the rio Tramandahy, in about latitude 29° 57′ S., is named Torres beach.

Torres.—At 63 miles SW. of the cape is the town of Torres. Here is a small bay which has been favorably reported on by engineers as a suitable place for the formation of a harbor. At about 2 miles north of the town, is the mouth of the rio Manpituba. At one mile eastward of the town is a low islet about 200 yards in length. The rio Tramandahy, at about 40 miles SW. of Torres, is formed by the connection of several lakes which overflow into the sea.

Lights are intended at Torres and Tramandahy, and a lighthouse is building at Mostardas.

Coast.—The coast southward is known as the praia do Pernambuco, or Tramandahy, as far as Mostardas in 31° 20′ S.; here it forms a bay in which small vessels sometimes obtain shelter from continued southwesterly winds. The town of Esmenigildo stands WSW., distant about 9 miles from the point. Southward of this bay, to the bar of rio Grande do Sul, the coast is named praia Estreito, the town of that name standing about 25 miles NE. of the bar of rio Grande.

The coast is a little more elevated than that northward of Torres, especially midway between the towns of Esmenigildo and Estreito, there being more vegetation and hillocks. The trees end about 15 miles north of rio Grande do Sul. Along the whole of this part of the coast, villages may be seen in clear weather at a distance of 3 or 4 miles from the shore. The SE. winds blow on it with much force and cause a a heavy sea; these winds are preceded by those from the SW.

Winds.—The prevailing winds on the coast of Rio Grande do Sul are the NE., varying from NNE. to ENE.; and SW., varying from SSW. to WSW., the former blowing chiefly from November to May, and the latter in June, July, and August. NE. winds usually continue from three to five days, sometimes lasting with little intermission much longer; they generally commence weak and gradually increase in force; they are often rainy, and succeeded by a calm and an atmosphere much charged with electricity; when they blow with much force it is a sign of a SW. wind.

SW. winds, on the contrary, are at the first most violent, commencing usually by a sudden gust; they may last very steadily for two or three days, and have much more force comparatively than the NE. winds, and usually clear the atmosphere. An east wind occasionally succeeds the NE., and the south and SE. follow the SW. West and WNW. winds are rare, but usually usher in unfavorable weather. The SE. winds blow with much force and cause a heavy sea.

It may be observed that the indications of the approach of the SW. winds, or pampero, are almost unerring, and can usually be detected from twelve to thirty-six hours before it comes on; it will occur after a succession of winds from the NE., and the longer the duration of winds from that quarter the more violent will be the SW. blast; a calm will usually succeed the NE. winds, the sky will be cloudy, the atmosphere heavy and charged with electricity, the thermometer will rise and the barometer fall, and in the horizon from north to west a misty atmosphere will appear, in which much lightning will usually show at night; and in the western and southwestern horizon dark clouds will gradually rise, accompanied by thunder and lightning until the wind comes on in its full force.

Several hours before the wind is felt the water on the bar of rio Grande do Sul will rise, from the accumulation of the sea between the banks at the bar and the coast to the southward, and a ground swell from the southward will be experienced.

The current between Sta. Catharina and rio de la Plata has a tendency to set from north to south, and during the NE. winds it sometimes runs at the rate of 40 miles a day. There appears to be some doubt as to the current here being wholly regulated by the winds, though it is possible that a continuance of south or SW. winds may occasionally check or overcome it from the northward. During SE. winds the sea is always heavy, and then the current sets toward the shore, and several wrecks are believed to have taken place in consequence.

Coast.—The province of Rio Grande do Sul, the most southern in Brazil, bounded on the north by the Curitiba and the province of Santa Catharina, and on the south by that of Uruguay, is about 385 miles in length, with a population of about half a million. It consists chiefly of large plains covered with herds of cattle, and mountain ridges traverse it in various directions, but none of them of any great height.

Several large rivers have their source in this province, of which the Uruguay, the Jacuhy, and the Camapuam are the most important.

Rio Grande do Sul.—Towns.—The town of Rio Grande (or São Pedro do Sul) is built on the north side of a low peninsula not more than 3 or 4 feet above the water, about 6 miles within the entrance points of the river; it is of some extent, containing about 18,000 inhabitants, of whom a large number are Portuguese and Germans; its extremely low situation subjects it to occasional floods. São José do Norte stands about 2½ miles ENE. of it on the eastern side of the river; the ports are quite distinct, and for many years had separate customhouses.

The principal articles of export consist of hides, horns, bones and bone-ash, dried beef, wool, hair, agate, pebbles, etc.

The United States is represented by a consul and vice consul.

Communication.—There are three railway lines in operation. The first line runs from Rio Grande do Sul to Bage through Pelotas, a distance of 174 miles. The second, which is about two-thirds finished, will connect Porto Alegre with Uruguayana, where the Brazilian Government has a customhouse, a distance of 378 miles. The third is 26 miles in length and connects Rio Grande do Sul with New Hamburg. The steamers of six different companies call at Rio Grande do Sul, giving constant communication with the coastwise ports.

Coal.—About 350 tons are usually kept in stock.

Patent slip.—A patent slip has been constructed which will take vessels not exceeding 10 feet draft.

The bar.—The banks surrounding the bar of rio Grande do Sul are composed of fine sand, and extend about 2½ miles southward of the entrance points; they are continually changing their position, and therefore no stranger should attempt to cross the bar without a pilot. The bar is indicated by the breakers on either side, and lies about south from the lighthouse; the deep-water channel is marked by buoys, the position and color of which are subject to constant change. Temporary signal staffs are erected on the beach to direct vessels in the deepest water.

Vessels must lighten to the depth of water on the bar, and no opportunity should be neglected in crossing. It is contemplated to deepen the bar by the use of powerful dredges. During the year 1889 vessels drawing 9 to 13 feet entered the river. H. M. S. *Beagle* (1891) found 15 feet water on the bar.*

The highest water is caused by the pamperos or SW. winds, when vessels may cross the bar at its commencement if prepared to take advantage of it; but if the wind should be strong it soon causes a heavy sea on the bar, when they can not enter; and should it veer to the SE. (which it sometimes does), and blow hard, the water on the coast being shallow the sea rises quickly and it becomes dangerous for deeply laden vessels, consequently many are lost in the neighborhood of the port. It is advisable for vessels of 10 feet draft to take a tug, unless there is a good fair wind.

There is a channel carrying 4 feet water between the SW. bank and the west point of entrance to the river, available for boats and convenient in giving assistance to vessels in distress about the SW. banks. Pilot boats when caught to leeward use this channel. There is also a channel northward of the bar.

Buoys.—Two black buoys are moored in about 5 fathoms, 4 miles S. 18° W. (S. 14° W. mag.) from the tower, and a red buoy ¼ mile N. 64° W. (N. 68° mag.) of the inner black buoy. These are the outer buoys, inside which is considered pilotage waters.

The channel from inside the bar to São José do Norte is regular, and bounded on either side by low sandy land; the hillocks on the western side vary from 30 to 80 feet in height, terminating at Mangueira point, where there is a flagstaff which communicates with São Pedro do Sul.

From the extremity of the peninsula of São Pedro do Sul, a shallow, sandy flat extends to the eastward about one mile, and forms the westward side of the channel leading to São Pedro do Sul, which is very narrow and marked by buoys. In it the depths are from 9 to 20 feet. The eastern and northern sides of the channel are formed by extensive sand flats, connected to Marinheiros island; eastward of these flats is the main channel of the river.

The shore on the eastern side of the main channel is bordered by an extensive shallow flat, which runs nearly north, and at one mile NE. of the lighthouse extends one mile off shore, when it trends to the northeastward, and terminates at the commencement of the sandhills 30 to 90 feet high, southward of São José.

Light.—From the light tower, at one mile within the east point of entrance to the river, is exhibited a flashing white light *every minute; fixed* for *thirty seconds*, then *one flash* and a short eclipse *every six seconds* in the *next thirty seconds*. It is elevated 114 feet above high water, and should be visible in clear weather from a distance of about 16 miles.

---

*In 1892 the depths over the bar were said to exceed 14 feet on 250 days.

The lighthouse, 104 feet high, is painted red.

Signals.—When within signal distance of the watchtower the vessel should hoist the signal of her draft of water, and for this purpose she should be prepared with a red flag, a white flag, a blue flag, and a blue burgee or pennant. The signal should be hoisted so as to be clearly seen from the watchtower, and in order to prevent mistakes no other signals if possible should be made at the same time.

The signal to approach the bar is a red flag hoisted at the large flagstaff of the watchtower, and will be always hoisted when the bar is practicable; but it must be understood that those vessels alone are to comply with it whose draft of water may be equal to or less than that indicated at the same time by the signal exhibited from the smaller flagstaff of the watchtower.

When the signals are hauled down from the watchtower, or pilot boat stationed at the bar, vessels can not enter, and they should immediately stand off. From want of attention to the signals, the red flag is often hauled down, in consequence of one or more vessels running into danger, thus obliging all to haul of, some losing their chance of getting in through the neglect of others.

The following signals are hoisted at the small flagstaff of the watchtower, and at the pilot boat at the bar, to indicate the greatest draft with which a vessel may pass the bar; and also on board the vessels entering or leaving the port. to indicate their draft of water. The Brazilian Government has adopted the international code of signals, but at Rio Grande do Sul no attention is paid to any but the red, white, and blue flags, which are very small and indistinct; the result being to keep vessels beating outside the bar for many days:

Signals.	Significations.		
	′	″	
A white flag	7	3	On the bar, or vessels' draft.
A blue flag	7	8	Do.
A red flag	8	0	Do.
A white flag over a blue one	8	4	Do.
A blue flag over a white one	8	9	Do.
A white flag over a red one	9	2	Do.
A red flag over a white one	9	6	Do.
A blue flag over a red one	9	10	Do.
A red flag over a blue one	10	2	Do.
A blue burgee over a white flag	10	6	Do.
A white flag over a blue burgee	11	0	Do.
A blue burgee over a blue flag	11	3	Do.
A blue flag over a blue burgee	11	7	Do.
A blue burgee over a red flag	12	0	Do.
A red flag over a blue burgee	12	4	Do.
A blue burgee over a white flag, with a blue flag under	12	8	Do.
A blue flag over a white flag, with a blue burgee under	13	2	Do.
A blue burgee over a white flag, with a red flag under	13	6	Do.
A red flag over a white flag, with a blue burgee under	13	10	Do.
A blue burgee over a blue flag, with a red flag under	14	2	Do.
A red flag over a blue flag, with a blue burgee under	14	7	Do.
A red burgee over a white flag, with a blue flag under	15	0	Do.

When, for want of a favorable wind, vessels inward or outward bound can only proceed by towage, a white flag with red swallow tails will be hoisted above the signal indicating the number of feet on the bar, which will be repeated by the pilot boat stationed there.

The signal for a tug is the national flag hoisted at the fore over the flags for the draft of water.

If a vessel require assistance, the flag of its nation should be hoisted half-mast high. If provisions are required, her distinguishing flag should be hoisted under the national flag. If water is required, the distinguishing flag should be hoisted over the national flag. If an anchor and cable are required, the distinguishing flag should be hoisted at the peak.

For vessels at the anchorage near the lighthouse, and about to leave the port, the depth of water will be shown by signal from the flagstaff close to the pilotage wharf; and whenever this depth is sufficient they are at liberty to proceed, after having been visited by the bar master. They should be ready to sail on the shortest notice, as a delay of a quarter of an hour, together with the time required to be at the bar, may for weeks deprive a vessel of the chance of getting out.

There is a telegraph by flags between the village at the bar and the town of São Pedro do Sul, by which a communication may be made by vessels at the anchorage west of the lighthouse or those coming in, through the pilot, with the consul or a vessel's consignee. The signals are exhibited from staffs, one near the wharf, in front of the lighthouse, called the pilotage wharf; the second. on the west side of the river; and the third, on the theater at São Pedro do Sul.

Pilots.—Government pilots are supposed to take all vessels across the bar and up to the first anchorage; the charge from thence to São Pedro do Sul being $16 for all foreign vessels. The bar should never be crossed without a pilot on board, unless the bar boat is at her station on the bar. When the bar boat is unable to remain out and the bar is still practicable, pilots come out in tugs. The signal for a pilot is the vessel's national flag under the signal of her draft of water, at the fore; the pilots do not always go on board, but direct the vessel by the waving of a flag.

Anchorages.—Vessels awaiting an opportunity to enter the river anchor about 1½ miles SE. of the bar in 7 fathoms, with the lighthouse bearing about N. 20° W. (N. 24° W. mag.), distant 4½ miles. There is some difficulty in weighing if the anchors have been down long, as they sink deep into the sand which lies under the mud.

The port of Rio Grande do Sul from the entrance points to about ½ mile north of São José do Norte is about 7 miles in length, and in navigable waters about ½ mile in width.

In this space there are four anchorages; that west of the lighthouse, about 3 miles inside the bar, is good holding ground in 5 to 7 fathoms, sand and mud; here all vessels remain after entering the port until they have been visited by the authorities.

The second anchorage is at the confluence of the channels which run, respectively, to the town of S. Pedro and that of S. José. Vessels which have not a fair wind for S. Pedro usually anchor here, the bottom being mostly mud, but the anchors occasionally drag.

The anchorage at S. José is capable of accommodating a large number of vessels in from 5 to 7 fathoms, sand and mud, good holding ground, and well sheltered from all winds excepting the SW.

The anchorage of S. Pedro is sheltered from all winds excepting those from the NE., but vessels occasionally drag their anchors.

The Brazilian vessels are moored to the westward of the customhouse wharf, and foreign vessels to the eastward, and secured head and stern.

The wharves are left clear for lighters and coasting steamers.

Tides.—The tides in the harbor sometimes run strong, but irregular as to time; their direction and velocity appear to be entirely governed by the wind; the highest water occurs immediately before and during the continuance of southwesterly winds, which blow occasionally, generally lasting two or three days. NE. winds lower the river. A current of about 3 miles an hour runs out of the river during the ebb and carries the discolored water some distance beyond the bar, presenting the appearance of shoal water, which in reality does not exist. The ordinary rise is from 1½ to 2 feet.

Directions.—During northeasterly winds, a vessel should approach the bar of rio Grande do Sul from that quarter, make due allowance for a strong southerly set, and go no farther south than latitude 32° S. until her position is ascertained. As shoal soundings extend some distance from the coast, the lead should always be used, especially during hazy weather, and on no account to shoal into less than 6½ fathoms, unless the position of the vessel is known; and in running to the southward, close the coast a little northward of the lighthouse, when two towers of the church of São José do Norte will be seen, then the lighthouse and watch tower will appear like two sails.

When the wind is from southwestward the lighthouse should be made from the southward, and in either case keep in not less than 7 fathoms water. The lighthouse may be approached on a N. 20° W. (N. 24° W. mag.) bearing to that depth.

Unless the weather is unusually fine, the sea breaks occasionally on the bar, and as the bar frequently changes its position, no vessel should attempt to cross it without a pilot, but in case of necessity, or in vessels of light draft, the following directions should be attended to. Having sighted the lighthouse, hoist the signal of the vessel's draft of water, so as to be clearly seen, when on being repeated from the small staff on the watch tower and the signal made to close, the red flag hoisted at the tall staff, steer towards the lighthouse for the opening between the breakers, attending to the signals.

On approaching the pilot or bar boat, which is usually anchored on the bar close to the deepest water, steer directly towards her, observing her signal of the depth of water on the bar, which will be repeated by the watch tower. Should the signal shown indicate a depth of water equal or more than the vessel's draft, she may confidently proceed on; but if the signal of the depth of water exhibited from the pilot boat or watch tower, or the red flag at the large staff on the latter be hauled down, the vessel should stand off and on, or anchor for a more favorable opportunity.

On approaching the pilot boat a red flag will be waved from her in the direction the vessel is to steer; when held upright steer directly towards her. There is occasionally another pilot boat stationed in the inlet between the bar and the anchorage west of the lighthouse, which also directs the course of the vessel with a movable red flag. If the second boat should be in her station the vessel will be guided by its signals immediately after passing the first pilot boat; but if it should not be there she may act according to the signals of the first pilot boat.

If neither of the pilot boats are in their stations, and the red flag from the watch tower, the signal to approach, continues to fly, the vessel should act wholly on the signals from the watch tower, where on extraordinary occasions a red flag may be shown to guide vessels, as shown from the pilot boats. When over the bar, steer to the northward between the buoys marking the channel. When well inside the bar the water deepens rapidly, the channel widens, and the bank on either side shows distinctly.

In proceeding up the channel, keep along the western shore where it is steep-to, particularly abreast the sandhills; when abreast Mangueira point, steer towards the sandhills with a remarkable tall house amongst the trees, a little on the starboard bow, and along the eastern shore, keeping the buoy on the flats extending from the western shore, on the port side, and anchor where convenient off São José.

The channel to São Pedro do Sul is narrow and circuitous; caution is required in taking it, for if a vessel grounds when the water is high, considerable delay and expense may ensue. A vessel should have a fair wind, or employ a tug.

Lagoa dos Patos.—Channel.—This extensive lake, of which the rio Grande do Sul is the outlet, is the largest in Brazil. It is about 120 miles in length in a NE. and SW. direction, and 25 miles wide. It is separated from the sea through its entire length by a sandy peninsula averaging about 5 miles in breadth. This lake receives nearly all the streams which irrigate the northern and eastern portions of the country, and its water continues fresh as far south as Marinheiros island, near the towns of São José do Norte and São Pedro do Sul, often called rio Grande do Sul.

Between São José do Norte and Cangussu island, 22 miles to the northward, the lake is shallow, and the channel, marked by means of stakes driven into the ground, which often disappear, is intricate. The shoalest water in this part of the channel is in Cangussu pass, where there is about 10 feet, soft muddy bottom. After passing Cangussu the channel is easy, and along the eastern shore from light to light (placed on the principal points), with depths of 3 to 4 fathoms as far as Itapuan point. From the latter place to Porto Alegre, the channel again becomes intricate and shallow, the worst places being staked off. The current, if any, follows the direction of the wind. There are numerous shoals in the lake, but which the lead will give timely notice of the approach to.

Climate.—The climate of the province is mild and healthy, the greater part of the soil is fertile, and produces various kinds of grain and many of the fruits of Europe; the country has been styled the granary of Brazil. Timber is not very abundant, but of good quality. Among the minerals are gold, silver, iron, sulphur, and porcelain clay. The rearing of cattle, however, is what chiefly distinguishes the country, and gives employment to its inhabitants, an athletic and robust people. Horses and mules are bred to a great extent, and are highly valued for the excellence of their breed.

Porto Alegre, the seat of government of the province, and containing a population of 30,000 inhabitants, principally Germans, is situated at the northern extremity of the lake, at about 130 miles northward of the town of São José do Norte. The houses are built in the usual style of the country, with good streets; there is a hospital, an arsenal, and numerous wharves for coasters. Means exist for heaving vessels down. The exports are chiefly hides, tobacco, and grain. A railway is in progress to connect Porto Alegre with Uruguayana in the Banda Oriental.

The United States is represented by a consular agent.

The anchorage at Porto Alegre is off the north side of the town in about 2 fathoms.

Lights.—Fixed white lights are exhibited on the eastern shore of the lake, at Sarangonha island, Estrieto point, Bujuru point, cape Marca, Christovão Pereira point, and Itapuan point.

Pelotas.—The town of Pelotas is situated 10 miles above the bar of the river of that name, in the SW. corner of the lake. There is a depth of about 11 feet on the bar, and anchorage off the port in 2½ fathoms. The town, distant 1½ miles from the port, is connected by a tramway.

Coast.—The coast of Albardon de Juan Maria, which may be assumed to extend from the bar of rio Grande do Sul to the embouchure of the rio Chuy, a distance of about 120 miles, consists of a narrow and flat strip of land forming a boundary between the sea and lake Merim, with some smaller inland lakes; from the bar of rio Grande do Sul to cape Castillo the water is shallow, having midway at about 17 miles from the shore only 10 fathoms; nearer the shore the bottom is irregular, with patches of less than 5 fathoms. Several vessels of 10 feet draft have navigated close along this shore. Vessels of large draft should not, however, approach it too close.

The first remarkable object southward of the entrance to the Chuy, is a rocky point with a few isolated and partly submerged rocks off it, named Castillos Chicos; 3 miles beyond is the fort of Sta. Teresa, and 5 miles farther south is Palmar point, which forms the northern extremity of Castillo bay. Thence the flat sandy shore curves to the southwestward, and at the distance of about 20 miles is cape Castillo. At about 16 miles northward of the cape are two hills named mount de los Difuntas and Navaro hill, lying nearly east and west of each other.

Caution.—The coast of Albardon is frequented by wandering men, known by the name of "Montoneros." These men commonly flock to the shores of the sea whenever they nourish hopes of plunder, and convey everything they can pilfer into the interior.

Banks.—Between the bar of rio Grande do Sul and cape Castillo, a depth of 10 fathoms will generally be found about 14 miles from the land, but between latitude 32° 40′ S. and 33° 30′ S., the bottom at a distance of 10 miles from the shore is irregular, with patches of less than 5 fathoms. H. M. S. *Curlew* in 1865 found bottom at 6¾ fathoms at 13 miles from the coast in latitude 33° 13′ S., and a bank of 10 fathoms, 15 miles southeastward of it; other shoal casts of 8 and 9 fathoms named Triton, Bouverie, and Lecky bank will be found at a distance of about 30 miles from the land in this locality. A bank of 8 fathoms, sand and shell, has been reported 33 miles eastward of the entrance to rio Grande do Sul; position, not known.

Nelson bank, of 19 fathoms, lies about 270 miles eastward of the rio Grande do Sul, in about latitude 32° 30′ S.; longitude 46° 45′ W.

CHAPTER IX.

COAST OF URUGUAY RIO DE LA PLATA; NORTH COAST; CAPE CASTILLO TO COLONIA.

The Republic of Uruguay, or the Banda Oriental, as it is more commonly called, occupies the north side of the rio de la Plata, opposite the Argentine Republic, and is separated from it on the west by the Uruguay river, which gives its name to the Republic. It is the smallest independent State in South America, and has an area of 72,172 square miles, with a population of about 706,500.

In the north, where it touches Brazil, spurs and offshoots of the great plateau reach southward across the boundary. The principal chain of hills is the Cuchilla Grande, which terminates at Montevideo; the west and south are characterized by undulating, grassy plains. The most important river is the rio Negro, which has a course of 270 miles from the sierras of Tacuarembo to where it joins the Uruguay, below Fray Bentos, after draining the greater part of the central region.

Montevideo, the capital of Uruguay, situated on the north side of the estuary of La Plata, is a well built city, and has an extensive commerce with all parts of the world.

Productions.—The soil of Uruguay is rich and fertile, producing in abundance every kind of grain and fruit known in temperate or subtropical climates. The medicinal plants comprise poppy, wormwood, gentian, balsam, coriander, camomile, licorice, marsh-mallow, rosemary, elder, and sarsaparilla. The wealth of Uruguay is chiefly in its pastures, which support immense herds of cattle, horses, and sheep.

Climate.—Uruguay is a healthy pastoral country; the winters are cool, wet, and variable. The climate of Montevideo is similar to that of Buenos Aires, except that it is about 8° cooler in the hot season.

The Rio de la Plata, discovered by Juan Diaz de Solis in 1508, is a large estuary at the confluence of the rivers Parana and Uruguay. It is about 150 miles in length in a WNW. and ESE. direction, and its breadth at the entrance, between punta del Este on the north and cape San Antonio on the south, is 120 miles; but it suddenly narrows, as at Montevideo it is only 50 miles wide; between Colonia and Punta Lara, below Buenos Aires, 20 miles; and at the mouth of the Uruguay and the Boca de Guazu (Parana), little more than 4 miles. It is a remarkably shallow estuary, and above Montevideo two-thirds of it is blocked up by shoals with less than 12 feet water over them.

The nature of the bottom of the La Plata is variable; on the banks it is a very fine hard sand; in the deeper portions it is ooze of a neutral tint, soft, and of a sticky nature.

The north shore is comparatively high and rocky. The whole southern shore is low, uniform in appearance, and bordered by a bank. The 3-fathom line of soundings extends northward of cape San Antonio to a distance of 9 miles, then curves round the bay of San Boronbon, passing 12 miles SE. of, and 25 NE. of Piedras point, joining the tail of Ortiz bank, and forms a bar of that depth, about 9 miles wide, inside of which the water deepens; thence the 3-fathom line continues to the westward, at the distance of from 5 to 10 miles off the southern shore. English bank occupies a large space in the fairway of the entrance, and the Ortiz bank stretching southward from the north shore, with that of the Chico bank on its SW. side, are the great impediments to the navigation of this large and important inlet.

On account of the large body of water brought down by the rivers, which drain an area of about 1,200,000 square miles, and the general movements of the waters being greatly influenced by the wind, the currents are variable. In light winds and fine weather the tides are generally regular, but the mouth of the estuary being wide and shallow the water flows easily in when the wind is from seaward, and is forced rapidly out when the wind is off the land.

The water continues fresh as far down as the Santa Lucia river, 12 miles above Montevideo, when it becomes brackish. It discolors the sea at a distance of about 75 miles from the mouth of the river. Vessels of large draft may navigate as far as Montevideo, and those of moderate draft to Buenos Aires and Hornos islets, NW. of Colonia. Small vessels enter the inner road of Buenos Aires to within about ½ mile of the town.

Cape Castillo is the most northerly point that a ship should sight if from the state of the weather or the position of the vessel it should be thought prudent to make the land before running up to Lobos islet. This cape has a white rounded sandhill, 184 feet high, and named Buena Vista, at its back, with its summit towards the NW., ending in a sandy peak. There are patches of black bushes on its white sides, and its isolation and peculiar form render it a good mark for this part of the coast. It may be seen in clear weather about 15 miles. Polonio light, 3 miles southward of cape Castillo, should also be seen. Shelter may be found against SW. winds in Castillo bay.

Pilots.—A pilot cutter, with pilots for rio de la Plata and other ports in Brazil, will be found cruising in the vicinity of cape Castillo. Vessels for rio de la Plata are strongly recommended to employ them. In bad weather they sometimes run to capes Castillo or Santa Maria for shelter, and with strong easterly winds to Maldonado. The pilot cutters carry a large blue flag at the masthead (international signal flag P).

Castillo Grande islet, 102 feet high, is situated 1¼ miles eastward of cape Castillo. Little Castillo lies ⅜ mile west of it nearly ½ mile from the shore. In the channel between the two islets there is a depth of from 8 to 9 fathoms, sand and mud.

Castillo bay.—From cape Castillo the coast to the NW. forms a small sandy bay, where boats may land. The shore continues low to the northward for a distance of 1½ miles.

Anchorages.—In Castillo bay vessels may find shelter from winds from SSE. round by the south to NW. The best anchorage is with the summit of Buena Vista, bearing about S. 34° W (S. 28° W. mag.), at about 700 yards from the point, in a depth of 4 to 5 fathoms, hard sand. Before dropping the anchor it is necessary to be sure of the nature of the bottom, as patches of rock are scattered about.

There is anchorage also in 3 fathoms water, fine sand, in the bay formed of cape Castillo and Little Castillo, at 400 yards from the shore; and, in case of its coming on to blow from the NE., a vessel could get out between the islet and Coronilla point, where there is a depth of 3 fathoms in the channel, 150 yards wide.

These anchorages were formerly much frequented. Many vessels disabled by a pampero at the mouth of the La Plata have been driven off a long way to sea, whereas had they known of these anchorages close at hand they might have run for them. Vessels, however, should be on the watch for the wind shifting to the NE., when they should put to sea immediately, as that wind raises a heavy sea on this coast.

In the angle of the bay at the very foot of Buena Vista there is a small stream where boats can get fresh water easily. There is no fuel but the brushwood on the hill.

Cape Polonio lies 2½ miles southward of Coronilla point, the intervening coast being sandy downs from 12 to 18 feet high. The cape is a steep rocky promontory forming three points; that to the SE. being named Polonio; above it is a greenish coneshaped hill, rising about 120 feet above the sea, which seen from the SW. or NE. assumes the appearance of an island. In the bay between capes Castillo and Polonio there is anchorage with offshore winds in a depth of 5 fathoms, at ½ mile, and in 7 or 8 fathoms at one mile from the shore, sand and mud.

Shoal.—Off cape Polonio, in latitude 34° 20′ S., longitude 53° 26′ W., where the chart shows 13 fathoms, is an 8-fathom shoal, hard bottom. The water is very much discolored in this locality.

Caution is necessary when navigating in this vicinity, as shoaler water may exist.

Light.—On cape Polonio, from a lighthouse constructed of gray masonry, with three white horizontal bands, is exhibited a *fixed* white light, elevated 137 feet above the sea, and should be visible in clear weather from a distance of 18 miles. The lighthouse appears like a sail when sighted from the northward, and the bands from want of whitewash are scarcely to be distinguished.

Torres islands are a group of three arid rocks from 12 to 18 feet high. The two inner, named Raza and Encantada, are surrounded by a reef; the third, named Islote, lies 1¼ miles eastward of the cape, and at 200 yards to the NE. of it is a detached rock generally above water. A dangerous reef, barely awash, named the Bisson, lies midway between Islote and the other islets. Torres rocks, as well as the Castillos, are much frequented by seals.

Anchorage.—There is fair anchorage with tolerably even bottom in the bay north of cape Polonio, in 5½ fathoms, with Islote bearing S. 50° E. (S. 56° E. mag.) and the lighthouse S. 40° W. (S. 34° W. mag.).

Polonio rock is a dangerous rocky shoal lying 2¼ miles S. 40° W. (S. 34° W. mag.) from the cape. It extends ½ mile in an ESE. and WNW. direction, and the least water over it is 11 feet, while close alongside there are 11 fathoms. The shoalest spot, which breaks in rough weather, is one-third its length from its western end. Between the shore and the reef there is a passage 2 miles wide, with 10 and 11 fathoms sand and mud, but the mariner is cautioned to make well sure of his bearings before he trusts his vessel in the vicinity of this dangerous shoal.

Polonio bay, situated on the west side of cape Polonio, affords fair anchorage with offshore winds, in 7 fathoms, fine sand, with the cape bearing N. 62° E. (N. 56° E. mag.). It is, however, necessary to proceed to sea should the wind veer to the eastward of NE. A vessel, if detained in this neighborhood, may anchor northward or southward of the cape according to the wind. At times a heavy swell sets into these small bays.

Tides.—It is high water, full and change, at cape Castillo at 8h. 30m. The rise is much influenced by the wind, southerly and SE. winds often raising the water 6 feet, and occasionally 9 feet, as shown by the marks left by the sea on the rocks. In fine weather the tides are tolerably regular, and the rise at springs is about 2 feet.

Rubia (Red) point.—The coast from cape Polonio extends in a low range of sandy downs, SW. for 20 miles, to a red cliff, about 50 feet high, named Rubia, which is remarkable as the only cliff of that color in the whole extent of the mouth of the La Plata, whence it takes its name. From a distance it resembles an island.

With the exception of Polonio rock the coast is clear of danger.

Cape Santa Maria, known to the natives as punta de Rocha, is a low point 4¾ miles southward of Rubia point, the coast between forming a small bay. A reef of rocks extends 200 yards to the southward of the cape.

There is anchorage west of the cape, with offshore winds, in 6 or 7 fathoms water, about ¾ mile from the beach.

Light.—On cape Santa Maria, from a lighthouse 125 feet high, is exhibited, at an elevation of 132 feet above the sea, a *revolving* white light, which attains its greatest brilliancy *once in every minute*, and should be visible in clear weather from a distance of 18 miles.

Rock.—In 1865 the steamship *Herschel* struck on a rock stated to lie off cape Santa Maria. In searching for this rock a depth of 6½ fathoms was found at 2 miles N. 79° E. (N. 73° E. mag.) of cape Santa Maria. Until the nonexistence of the doubtful danger is ascertained vessels should give the cape a good berth.

Bank.—In 1872 a dangerous sandbank was reported off cape Santa Maria. The bank lies parallel to the shore about 2 miles distant; its SW. end bears about S. 6° W. (south mag.) from the flagstaff at port Paloma. There appeared to be a deep channel inside the sandbank. The existence of this bank is considered doubtful.

Paloma islets.—A short distance to the northward of the cape are two small islands, which together form the small harbor of Paloma. The northern islet, named Paloma, 26 feet high, is the larger. A reef extends northeastward of it, which breaks heavily. Tuna, or Espinosa, the other islet, is low, sandy, and covered with brushwood.

Paloma harbor is a circular basin about 800 yards in diameter, having a general depth of 8 or 9 feet, hard sand. It is well adapted for a few small coasters. The entrance, which is between the two islets, is narrowed by the reefs which extend from either islet toward the center and form a channel about 50 yards broad. Nearly in the center of the channel there is a rock having a depth of 7 feet. The deepest water is on the Paloma side. By keeping as close as possible to the edge of the surf on that side will lead in about 11 feet water and clear of the rock, which it will be prudent to buoy before the vessel enters. The channel on the other side of the rock has a depth of only 8 or 9 feet, uneven bottom. Just inside the entrance there is the deepest water, about 15 feet. Moor NE. and SW., as the space is very confined.

The marks on the rocks indicated a rise and fall of about 3 feet, but the tides are much influenced by the winds. There is a small stream of fresh water at the northern end of the harbor. Abundance of game may be shot near Rocha lagoon, about 5 miles inland.

Paloma (Arecife) road lies to the northward of Paloma islet and harbor, and affords anchorage in 5 fathoms, well sheltered from NW. and SW. winds, about ¾ mile off shore. The bottom is very uneven in approaching from the northward.

A bank, which occasionally breaks, extends 1¼ mile N. 28° E. (N. 22° E. mag.) of Paloma island, and is one mile distant from the shore.

Caution.—Although cape Castillo could be recognized at a distance by the round white sandhill of Buena Vista, and rising up in advance of it, the steep black islet Castillo Grande, with cape Polonio about 3 miles to the southward, it has been often mistaken for cape Santa Maria, which has the appearance of undulating sandhills, varying from 50 to 80 feet in height. Since the erection of lighthouses on capes Polonio and Santa Maria this mistake should not occur. In heavy weather, if the land can not be made out, come no nearer than 15 fathoms water, as there are depths of 12 fathoms close to Polonio rock.

Coast.—The coast from cape Santa Maria extends westward for 6 miles to Rocha lagoon, thence southwesterly for 21 miles to San José Ignacio or Piedras punta. It is a sand beach similar to that to the eastward. Not a rock nor a single remarkable object exists on this uniform coast. A few farm houses, surrounded by a few trees, are dotted on the summits of the sandy downs which rise from 60 to 130 feet above the sea, and gaps in these sandhills indicate the presence of the lagoons Rocha, Cardal, Garçon, Blanca, etc. This coast is clear of danger, and at the distance of ¾ mile from the shore there are from 6 to 11 fathoms water.

San José Ignacio point, or punta Piedras, so named on account of the lagoon of this name in the vicinity, will be recognized by the lighthouse. It may also be known from the offing by two large farmhouses, one situated 2 miles to the NW., the other 6 miles to the NE. The point is formed by a frontage of rocks ¾ mile in extent east and west, divided by a small sandy beach; reefs surround the point, forming within creeks where boats may land.

At one mile south of the cape there is a ledge of rocks with depths of from 5½ to 8 fathoms.

Light.—From a lighthouse on San José Ignacio point, at an elevation of 103 feet above the sea, is exhibited a *fixed* white light,* visible in clear weather from a distance of 15 miles.

This lighthouse is reported to have two narrow white bands around the upper part, and one around the lower part.

San José Ignacio lagoon empties into the sea to the westward of the point of that name; this lagoon is about 8 miles long in a northerly direction, by an average breadth of 3 miles, and is said to be deep. The sandy beach recommences to the westward of San José point, interrupted by some rocks, 11 miles westward of the point, near the mouth of the Maldonado rivulet; these rocks form a slight projection named Maldonado point. Between this latter point and that of San José Ignacio, the coast forms a slight bay, but westward of Maldonado point the coast has some scattered rocks.

Punta del Este, or East point, which is considered the north entrance point of the La Plata, forms the eastern part of Maldonado bay. It is a small dark headland, about 50 feet high, at the end of some sandy downs, with a lighthouse on its summit. Isolated banks extend off about 2 miles to the southwestward. From the offing, in fine weather, the summits of the Pan de Azucar and sierra de las Animas may be seen in the NW., 8 or 10 miles before seeing punta del Este.

Light.—On the highest part of punta del Este, at ¼ mile from its extremity, is a white tower 90 feet high, from which is exhibited, at a height of 152 feet above the sea, an intermittent white light, visible *ninety* seconds and eclipsed *twenty-five* seconds, and should be seen in clear weather from a distance of 18 miles.

---

*Intended to be altered to a red light.

Within 5 miles the eclipses are not total. At the distance of 9 miles from Lobos island, and at the height of 23 feet above the sea, the light is shut out by the summit of the island on a N. 44° W. (N. 51° W. mag.) bearing.

Lobos isle, 4 miles SE. of East point, is flat, rugged, 65 feet above the sea, and may be seen from a distance of 12 to 15 miles. It is usually visible a little sooner that East point; its coast is rocky, and can only be approached by a sandy creek on the north side of the isle, near the eastern huts of the seal hunters. Off the north end of Lobos for the distance of 600 yards the bottom is uneven with several rocky heads of 3 fathoms. The west side of Lobos is steep-to, and there are depths of 6 fathoms at less than 400 yards from the beach; but on the east side is a detached reef which extends eastward nearly one mile from the shore. The crown of the reef is formed of two large rocks always uncovered; between the reef and the isle there is a depth of from 3 to 7 fathoms water.

Between Lobos and the main there is a channel 4 miles wide, with a depth of 10 to 15 fathoms, mud, with sand and mud; this channel, however, had better be avoided in light winds with a swell, as the currents are stronger than in the offing. Lobos, as its name denotes, abounds in seals; they live chiefly on the rocks on the east and north side; in the interior of the isle there is an abundance of rabbits.

Doze shoal, on which depths of 4¼ to 6½ fathoms were obtained, is reported to be situated with the SE. point of Lobos isle, bearing N. 22° W. (N. 29° W. mag.) distant about 2 miles, but neither the exact position, nor the extent of the shoal, could be ascertained on account of bad weather. The locality has recently (1890) been examined and from 17 to 18 fathoms were found on and around the reported position of shoal.

Stork knoll.—A small patch of 6 fathoms, with 10 to 13 fathoms around, reported by H. M. S. *Stork*, lies with the following bearings: Center of Lobos isle, N. 58° E. (N. 51° E. mag.), Punta del Este lighthouse, N. 7° E. (north mag.).

It is to be remarked that the *Stork*, returning to this spot to make a further examination, was unable to find her own knoll, which is not very surprising seeing that it is probably of small extent, and that there is some difficulty in accurately fixing the position of a ship in this locality, at some distance from the land, with a few objects.

Ready shoal.—A depth of 6 fathoms, with 15 fathoms close around, reported by H. M. S. *Ready* on the spot formerly marked on the chart as 9 fathoms, lies with Lobos isle bearing N. 86° E. (N. 79° E. mag.), distant 7 miles. This shoal appeared to be circular in shape and about 400 yards in diameter.

Ruby patch.—A patch of 6 fathoms, rock, was passed over by

H.M.S. *Ruby*, when proceeding from Maldonado to verify the *Ready's* soundings. Possibly less water may exist. It lies with Lobos isle, bearing S. 83° E. (east mag.), distant 5 miles.

Caution.—As accumulated evidence points to the possibility of the existence of other small knolls at the entrance of the rio de la Plata, the mariner should use every precaution in navigating this vicinity, and especially keep his lead going.

Pilots for the rio de la Plata cruise off Lobos, and it is advisable to employ their services.

Aspect.—Before continuing the description of the inner shores of the La Plata it will be necessary to describe the hills and mountains in the interior that are visible from the offing in clear weather, as they may prove useful in making the land. In approaching on the parallel of 33° 45′ S., at 10 miles off shore may be seen in the west the sierra del Carbonero, a range of hills 4½ miles long in a NE. and SW. direction, the center being the highest; it lies inland 9½ miles from the shore, and is on the frontier line between Brazil and Uruguay. On one of the slopes of the hills the fort of San Miguel is very conspicuous.

Cerro de los Difuntos, situated 25 miles south of the Carbonero range, is composed of several summits of about the same height; at 6 miles from the shore on the west side of a lagoon. Seen in the NW. this cerro presents a remarkable gap or ravine. At 5 miles westward is the bare conical hill of Chico de Navaro, rising from the center of a group of smaller hills. On advancing southwestward the rounded sandhill of Buena Vista close to cape Castillo, already described, will be visible.

Cerro Chafalote—This mountain range is much higher than those just described, and is 19 miles westward of cape Castillo. It is easily recognized by its isolation in the midst of the plain, its greater size, and its outline, which seen from the eastward presents three summits of which the center is the highest. This group of landmarks renders cape Castillo a preferable landfall to cape Santa Maria.

Silla Chica is a small saddle-shaped hill at 13 miles inland; and Silla Grande, a similarly shaped hill, lying 5 miles westward of the former, is rather more elevated; their form is more remarkable when seen bearing about north.

Morro San Ignacio is a lofty summit, 10 miles northward of San José Ignacio point. Los Tres Cerros, to the southwestward, is a hill with three summits, the westernmost being the highest, and it is easily distinguished from the offing.

Sierra de la Ballena is another range of rocky, blackish hills, extending in a nearly north direction from Ballena point. the western extreme of Maldonado bay. A large patch of white sand on the south slope of one of the hills, 2½ miles from the point, may be seen from a long distance seaward.

Pan de Azucar.—To the northward of punta Negra, or Black point, is a mass of mountains, of which the culminating points, the Pan de Azucar and the sierra de las Animas, are the highest summits of all the coast; they may be seen in fine weather at a distance of about 40 miles, and are consequently of great utility when a vessel makes the land in the parallel of, or to the SE. of Lobos islet. Pan de Azucar is a nearly regular cone, 1,230 feet high, at 3 miles from the beach.

Sierra de las Animas lies 5 miles NW. of Pan de Azucar, and is 1,610 feet high, but its summit is flattened, and has a slight depression in the form of a saddle, visible when seen bearing about WNW.

Maldonado bay, 5½ miles wide by nearly 2 miles deep, is formed between East point and Ballena point. It is exposed to SW. winds, which cause much sea, but a portion of the bay is sheltered by the small island of Gorriti. On the beach north of Gorriti is an iron pier, and on the beach east of the island is a wooden pier; but neither of these piers afford landing from boats unless a temporary ladder is secured to them. Inside East point is a small sandy cove, the only place at which supplies can be shipped when the surf is on the beach, after SW. winds.

The shores of the bay are clean with the exception of Arecife, or Granite point, 2 miles westward of the iron pier, which is rocky. Thence to a spot east of the north end of Gorriti the shore is backed by sandy hills and ridges, 20 to 90 feet high. Between the south end of the sandhills and the long flat hill, 50 feet high, which forms the promontory of East point is a low, sandy isthmus. The sandhill which is situated just to the north of the isthmus is well defined, and useful as a mark for the anchorage.

Maldonado.—The small town of Maldonado, which gives its name to the bay, stands ½ mile from the beach a little beyond the brow of a hill, about 100 feet high; its locality is indicated from seaward by a few trees, the cathedral towers and of the higher houses, and by a small tower 267 feet above the sea, which is of white color, and stands on the summit of the ridge. The customhouse is situated on the shore of the cove inside of East point, in the vicinity of the lighthouse, and is a large new building, painted yellow, the central portion being 2 stories high. There is a good wharf with landing steps at the customhouse. The cathedral towers, 321 feet above the sea level, and dome afford good marks and are more prominent than the old tower. There are two square bell towers and a dome painted a bright yellow color, and they are to the right of the old tower. The population of Maldonado has much diminished during late years; at present scarcely a fourth part of the number of houses are inhabited. San Carlos, a town of about the same size, is 7 miles further inland.

Landing.—The boat landing at the customhouse is a good one, but at the iron pier near the town the landing is difficult.

Gorriti island, which gives shelter to the anchorage, is nearly a mile in length north and south, and about 600 yards broad. It is low, of sand and rock, and has a small bay and beach on its west side. Some small batteries, and a storehouse for the produce of the seal fishery, existed here in the beginning of the century, but are now in ruins. North of these ruins there is an iron cable tank painted red. A rocky ledge extends 200 yards off its NW. end; and extending 600 yards from its NE. end there is a sandy spit, with a depth of 1¾ fathoms on its extremity, and must be carefully avoided.

Wrecks.—A wreck poorly marked by a log, moored by a rope, lies about $2\frac{2}{10}$ miles S. 1° E. (S. 8° E. mag.) Maldonado tower, and is said to have been there many years.

The wreck of a ship, the yards of which project above the water and mark the position, lies about $1\frac{9}{10}$ miles S. 7° W. (south mag.) of Maldonado tower. The hull is deeply buried in the sand and it had apparently been burned to the water's edge before sinking (1892).

Punta del Este bank.—At nearly ½ mile west of East point is the outer edge of a reef of rocks about 400 yards in diameter, with a rock awash at low water, on which the sea always breaks.

New, or Parker, rock, about 300 yards in extent, with 4 fathoms water on it, lies S. 80° W. (S. 73° W. mag.) distant one mile from East point. The south extreme of East point, bearing N. 75° E. (N. 68° E. mag.) leads southward of New rock; and Maldonado tower, over the SW. side of Gorriti, bearing N. 12° E. (N. 5° E. mag.) leads to the westward. The bottom near New rock is rocky and uneven, and the depth varies from 7 to 12 fathoms.

Sylvia bank.—This bank with a depth of 5 fathoms, least water found, is about 600 yards in extent within the depth of 10 fathoms. Its shoalest part lies with East point bearing N. 52° E. (N. 45° E. mag.), distant 2 miles.

Mostyn rock lies about ¼ mile eastward of the ruins, which are situated on the SE. side of Gorriti; the rock is 400 yards in extent, has 9 feet least water; though not in the direct track of vessels entering, it might pick up a vessel at night if too near the island.

The Monarch is a small rocky patch with 2¾ fathoms water on it; there are 4½ and 5 fathoms close to and round the rock within the distance of 200 yards. The shoal spot lies 1,200 yards N. 61° W. (N. 68° W. mag.) of the NW. point of Gorriti, leaving between a channel 600 yards in breadth with 6½ fathoms water. The leading mark through this channel is the old cemetery western dome which stands half way between Maldonado tower and the beach, bearing N. 21° E. (N. 14° E. mag.). The cemetery has two domes, but as they are not kept white, they are not conspicuous. Care must be taken not to use the eastern dome, as in that case the vessel would pass close to the rock.

To the westward of the Monarch there are no dangers, but a vessel should not shoal less than 6 fathoms. Maldonado tower on line with the iron pier, N. 41° E. (N. 34° E. mag.), leads 400 yards westward of it, and Pan de Azucar over a small low saddle immediately within Ballena point N. 61° W. (N. 68° W. mag.) leads on it; but kept open the apparent breadth of the Pan de Azucar either way, clears it north and south. The hut near the iron pier in line with the square white house west of Maldonado tower, and bearing N. 30° E. (N. 23° E. mag.), leads directly on Monarch rock.

Tides.—There are no appreciable tides in Maldonado bay; strong southerly and SE. winds raise the water 6 feet, and the opposite winds depress it. Westerly winds cause a strong current to set round Gorriti to the east and south.

Anchorage.—Vessels may anchor in safety in 4½ to 5 fathoms, sand over very stiff mud, with the NW. end of Gorriti island from S. 18° W. (S. 11° W. mag.) to S. 52° W. (S. 45° W. mag.), and Ballena point about N. 72° W. (N. 79° W. mag.). There is also anchorage sheltered from all winds but those from the SW. (which are the most dangerous here) eastward of Gorriti, in 5 or 6 fathoms, muddy bottom; but care should be taken to avoid Mostyn rock, already mentioned.

The ledge off the NW. end of Gorriti will shelter a vessel from south winds, which occasionally blow very strong. If a vessel intends making any stay it is necessary to moor, as the anchor soon becomes foul; moor open hawse to the SW.; the holding ground is very good, the anchor requiring a great purchase to lift it.

Pilots.—A pilot resides at East point, and is a general pilot to Buenos Aires, etc. Pilot cutters are also frequently off this bay, having pilots on board, both for Buenos Aires and Montevideo.

Supplies.—Water may be obtained from a small running stream, about 150 yards eastward of the iron pier. Moor the boats close to the beach, and lead hose off from the watering engines. The lower part of the water when it reaches the beach is brackish, but between the banks it is excellent; by sinking a tub to put the hose in, and having about 200 feet of canvas hose, and about 120 of leather, to lead through the water, 20 tons may be obtained in a day.

There is generally a little surf on the beach, and after a SW. wind for two or three days there is no landing on it; but in summer, water may, on an average, be had five days in a week. There is also a lake of good fresh water at 2 miles westward of the pier, within 50 yards of the sea. A vessel could anchor off this lake in fine weather but no vessel should remain there longer than is actually necessary, as the bottom is sand and the swell comes in heavily with SW. winds. Fresh beef and vegetables may be had at very moderate prices. Live stock is reasonable and cheaper than at Montevideo. Plenty of fish may be caught in the bay.

Directions.—A vessel bound into Maldonado bay may pass on either side of Lobos isle, avoiding the reef extending from its east side. East point will be known by the lighthouse. If southward of Lobos isle, the town and tower of Maldonado will be seen, and probably Pan de

Azucar, and sierra de las Animas NW. of it. Having passed the isle, East point should not be brought to bear eastward of N. 69° E. (N. 62° E. mag.), and when Maldonado tower is open of the SW. side of Gorriti island, bearing N. 12° E. (N. 5° E. mag.), haul up for either channel, keeping Pan de Azucar open of Ballena point.

When Maldonado tower is in line with the iron pier bearing N. 41° E. (N. 34° E. mag.) a vessel may haul in for the passage westward of Monarch shoal, until Pan de Azucar shows northward of the saddle on Ballena point; then steer for the anchorage, or the western dome of the old cemetery in line with the iron pier N. 21° E. (N. 14° E. mag.) will lead between Monarch rock and Gorriti island in 7 fathoms water. With the wind at SE. by E. a vessel may fetch the anchorage by passing east of the Monarch, but a tack must be made if westward of it. Do not approach the iron pier nearer than ¼ mile.

In rounding Gorriti island at night from the eastward, a stranger is liable to mistake the SW. end of the island for the NW., as the sandy bay between them is very low and not easily discerned in the moonlight or darkness.

Ballena point is bold and may be passed at a prudent distance. In working into the bay from the westward a vessel may stand into 6 fathoms water at the distance of a long ½ mile from the shore; and in approaching the Monarch, keep Pan de Azucar northward of the saddle on Ballena point.

Southeast channel.—Between the NE. end of Gorriti and the main the ground is uneven, but there is a channel about 200 yards in breadth carrying 4 fathoms water, which in fine weather may be used by small vessels having local knowledge, as no direct marks can be given. In fresh southerly winds the sea breaks right across. Pilot cutters and small coasters sometimes pass between East point and the reef west of it, but the current here runs strong and renders the vessels almost unmanageable in a moderate breeze.

Strangers in boats should be careful not to get set amongst the breakers of the reef, as they are treacherous in the finest weather.

Potrero bay, between Ballena point and Raza point, at 9 miles west of it, takes its name from an adjacent lagoon, which has its outlet in the bay. Potrero bay is clear, and affords anchorage with offshore winds in 5 to 6 fathoms, gravel bottom, at 2 miles from the beach. The white sandy beach in the bay forms a good mark for this part of the coast.

Punta Negra, or Black point, which presents an east and west headland or frontage 2½ miles in extent, is formed by three rocky points, separated by two small sandy bays. The eastern point is named Raza, the center Negra, and the western Iman; they are all steep, and are overlooked by the high grounds which are connected with Pan de Azucar. The depths about one mile off this headland range from 7 to 10 fathoms. From Iman point the shore trends in a northerly direction 3 miles to English point; the small bay which lies between is named

Puerto Ingles. Animas point, situated 5 miles west of English point, is low, and has a reef of rocks extending some distance from it.

Punta de Afila lies 7 miles westward of Animas point, with a clean sandy beach between. Two hills near the point, higher than the rest, are conspicuous from the offing; on the northern was formerly a lookout station. The slope of the southern hill forms Piedras point, which is low and bordered by steep rocks. The surf is heavy on this coast.

Afila and Solis rocks.—Afila rocks cover at high tides. They are about one mile in extent and lie 1½ miles south of punta de Afila.

Solis rock, 3¼ miles southeastward of Afila rocks and the same distance from Animas point, is about 600 yards in extent; it is covered at high tides, and the sea breaks on it constantly. There is a depth of 3 fathoms, sand and mud, between Solis rock and the shore.

Piedras Negras, the next salient point, lies westward 9½ miles from punta de Afila; the sandy beach between is broken by a rocky point named Pedro Lopez, and the Solis Chico rivulet flows into the sea about 2 miles westward of it. A rocky shoal encircles Piedras Negras point, and extends about ¾ mile off shore.

La Plaia de Santa Rosa, an extensive gravel beach, lies between Piedras Negras and Carretas, or Buceo point, a distance of 19 miles; it is clean and steep-to, with 3 fathoms near the shore. The sea is very heavy along this coast in all winds between south and east, and the strong currents which then prevail would drive a ship bodily ashore. Several vessels have been lost here, and their crews have perished, not from rocks, but from the heavy surf that breaks on the steep shore.

Close to the westward of Piedras Negras point is the small bay of Santa Rosa, about 1¼ miles across, with a depth of 3 to 4 fathoms, mud. A small stream of fresh water runs into it, and the beach is of hard sand and steep. At 6 miles farther to the west Pando rivulet flows into the sea, with the town of the same name on the right bank of the stream, 6 miles inland.

Carretas, or Buceo, point is low, rocky, and backed by a large hill, which has obtained for it also the name of punta Gorda. This serves as a mark to recognize the point. A small islet named Luz, about 5 feet high, surrounded by rocky and uneven ground ¼ mile distant on all sides, lies SE., distant 800 yards from Carretas point.

Carretas, or Pipas, rocks, a cluster about 10 feet above water, lie with their western extremity 1¾ miles eastward of Carretas point, and extend thence 800 yards in an easterly direction. The eastern rock (Mark rock) is distant 5¼ miles N. 63° W. (N. 70° W. mag.) of Flores Island lighthouse, and is visible about 3 miles, showing dark against the white beach. Rocks awash extend about 400 yards east and north of Mark rock, and broken ground of from one to 2 fathoms extends 700 yards northward of Carretas rocks.

Bump shoal, of 4 feet, lies 800 yards S. 65° E. (S. 72° E. mag.) of

Mark rock, with a depth of 4 fathoms, mud, between. This shoal rarely breaks, and is therefore more dangerous.

Sara bank, with 9 feet of water over its shoalest part and 4 fathoms at a short distance off, is about 800 yards long, and lies one mile S. 26° E. (S. 33° E. mag.) of Mark rock.

Forest King reef, with 6 feet water, is ½ mile long, in a NW. and SE. direction, and 300 yards broad. From the southern extremity of the reef, Flores Island lighthouse bears S. 76° E. (S. 83° E. mag.) 6 miles. The reef is steep-to, 3¾ fathoms, mud, being found within 200 yards of the rocks.

Flores island, at 7½ miles S. 68° E. (S. 75° E. mag.) of Carretas point, is a good landfall, and one always made. It lies 51 miles N. 85° W. (S. 88° W. mag.) of Lobos. The islands or islets are a mile in extent, in a NE. and SW. direction. The NE. portion, 42 feet high and about 400 yards long, is connected at low water with the SW. portion, distant 400 yards, by a ledge of rocks.

The island is in telegraphic communication with Montevideo, and is used as a quarantine station for vessels frequenting that port. The lazaretto is on the west side of the island, where, also, there is a pier, and a mooring buoy in 3 fathoms 100 yards off the pier. Shoal ground extends one mile northward of the NE. extremity of the island; also ½ mile westward of the lighthouse.

Cumberland shoal, with a least depth of 3 fathoms, lies S. 70° W. (S. 63° W. mag.), distant ½ mile from the lighthouse. Depths of 3½ and 4 fathoms extend 200 yards northward and 600 yards southward of the shoal, and there is 5 fathoms between it and the island.

Puno shoal.—From the NE. point of the islands a ledge of rocks extends about ½ mile, northward of which, and isolated, is Puno shoal, nearly ½ mile in extent north and south. From its shoalest spot of 1¾ fathoms the NE. point of the islands bear S. 7° W. (south mag.), distant ¾ mile.

Anchorage.—There is anchorage in 4¼ fathoms, mud, about 600 yards north of the landing pier; also all round the islands.

Light.—On the SW. extremity of Flores island, from a white lighthouse, 65 feet in height, is exhibited, at an elevation of 104 feet above the sea, a *revolving* white light *every minute*, and should be seen 12 miles in clear weather.

Bassuras bay, formed between Carretas and Brava points, is 5 miles in extent and one mile deep. Near the middle of the bay is the small islet of Meldroza, between which and the main is an anchorage for small coasters.

Buen Viaje reef is nearly circular, and about ½ mile in diameter. From its east end Brava point bears S. 81° W. (S. 74° W. mag.) 1¾ miles. The shoal is marked by three buoys, namely: A bell buoy on the eastern extremity in 4 fathoms, a buoy on the NE. extremity in 4 fathoms, and a buoy on the western extremity in 3½ fathoms.

Caution.—The navigator is recommended to approach this part of the coast with caution, as it has not been thoroughly surveyed.

Punta Brava, at 2 miles eastward of Montevideo, is a low point projecting ½ mile from the main, with a lighthouse on it, 200 yards from its extremity. A reef extends about 300 yards SW. from the point. At its extremity is a detached rock awash, and 200 yards beyond there is a depth of 4 fathoms, mud.

Vessels may round punta Brava at one mile distant, avoiding a bank of 2½ fathoms (supposed to have been formed by a wreck), reported to lie 2½ miles S. 31° W. (S. 24° W. mag.) of the point.

NOTE.—A survey of this vicinity by the U. S. S. *Essex* and *Yantic* in 1892 included the 3¼ fathom spot charted about ¾ mile N. 31° E. (N. 24° E. mag.), of the 2½-fathom shoal, and covered an area about 2 miles square. The least depth found was 3½ fathoms (reduced to 3 feet below the level of ordinary low water) about 1 1/16 miles N. 3° W. (N. 10° W. mag.) from the supposed position of the 2½-fathom shoal. The bottom was soft mud over the area surveyed.

Light.—From the white lighthouse on punta Brava, at an elevation of 69 feet above the sea, is exhibited a *fixed* white light, visible in clear weather from a distance of 10 miles.

Punta Sarandi is 3 miles WNW. of punta Brava, and forms the western extremity of the peninsula of Montevideo. The coast between is rocky, and forms a bay ¾ mile deep. In the middle of this bay is a sandy cove, named Plaia Ramires. The west points of the cove, named Perez, and Gabriel inside of it, have rocks extending a short distance off.

Montevideo bay is open to the SW., and is in the form of a horseshoe. Between puntas San José and Lobos, the entrance points, it is 2 miles across and the same distance in depth. It is sheltered from winds from west round northerly to SE. The eastern shore of the bay is the sea wall of the Central railway. Northward it is composed of sandy beaches and rocky points. The western shore, at the foot of El Cerro, is rocky. The bottom all over is of soft mud, with a few patches of rock. The depth varies from 15 to 10 feet.

The harbor, or inner anchorage, is close off the NW. face of the town, where there is from 9 to 15 feet water. The anchorage here is indifferent, as there is much sea during strong, southerly winds. Vessels are recommended to moor in all cases. The breakwater, which extends about 160 yards in a northwesterly direction from punta San José, being under water, except at low river, affords no shelter to the landing place during a pampero, and but little protection at any time. A buoy marks the extremity of it. A pole buoy in 10 feet marks the NW. extremity of the shoal water northward of punta Sarandi.

Storm signals.—On the approach of storms or bad weather, on the flagstaff of the Comandancia, by day a red and white flag will be hoisted under the national flag; at night a *red* light will be shown in place of the flag.

Islets, rocks.—On the east side of the bay, at ½ mile north of the town, and the same distance west of the sea wall, is a group of rocks named Familia, marked by the boiler of a wrecked steamer, above water. Rat island to the NW. was formerly fortified, but the buildings are now in ruins. A patch of rock awash at low water, about 200 yards in extent, lies 600 yards to the north of Rat island, and a rock having 6 feet water over it lies 600 yards to the eastward of Rat island.

Sarina rock, awash at very low water, lies 700 yards S. 20° E. (S. 27° E. mag.) from Rat island. It is marked by a black perch.

Triton shoal, of 7 feet, lies a good 200 yards to the eastward of Sarina.

Tagus rock, with a depth of 15 feet, lies with El Cerro lighthouse bearing N. 15° W. (N. 22° W. mag.), and the cathedral N. 70° E. (N. 63° E. mag.)

Wrecks.—A dangerous sunken wreck, with mast just showing at half tide, lies 800 yards eastward of Tagus rock, and is marked by two black *conical* buoys placed NW. and SE. of it, also by a hulk moored about 400 yards NE. of it, from which is exhibited a *white* light above a faint *red* light.

The wreck of the German steamer *Corrientes*, with mast showing at low water, lies 100 yards S. 15° E. (S. 22° E. mag.) from Tagus rock, and is marked by a black *spherical* buoy attached to it.

A vessel on fire (supposed to be coal laden) was run on shore southward of the town where she burnt to the water's edge, and became a complete wreck, with her masts gone. The wreck lies in 3 fathoms, with Montevideo cathedral bearing north (N. 7° E. mag.), distant nearly one mile.

El Cerro (the Mount) rises on the western side of the bay in the form of a bare cone to a height of 465 feet, at less than ¾ mile from the beach. It is crowned by a fort, on which there is a lighthouse. The Cerro is useful on all occasions, whether on a voyage up or down the river, as a conspicuous and easily recognized landmark, and by careful observations it will very materially assist in ascertaining the direction and force of the currents, which are so variable and uncertain.

Lobos point, the south extreme of El Cerro, has rocks off it to the distance of 800 yards, known as the White rocks. There is a depth of 15 feet only, at ½ mile southward from the point.

San Felipe de Montevideo, the capital of the Oriental Republic of Uruguay, or Banda Oriental, stands on a gently rising ground on the east side of the bay, occupying a peninsula, extending east and west 1¼ miles, by ½ mile in breadth. The warehouses, the wharves, and the lofty customhouse buildings produce a favorable impression on landing. The principal building is the cathedral, an imposing structure, with its dome and two towers, which may be seen from a long distance in the offing.

The trade of Montevideo is considerable; the exports consist principally of wool, hides, and tallow; and the imports of cotton and woolen fabrics, hardware, wine, etc. A large transit trade is done in provisions. The population of the city and the immediate neighborhood is 215,000.

The United States Minister to Uruguay and Paraguay reside here. The United States is also represented by a consul and vice-consul.

Communication.—Montevideo is intersected with tramways, and is in telegraphic communication with all parts of Brazil, and by submarine cable with Europe.

There is almost daily communication by river steamers with Buenos Aires. The English lines of steamers calling are the Royal Mail, Liverpool Brazil and Plate Company, and Pacific Steam Navigation Company.

Docks.—In Montevideo bay there are two graving docks, namely, Mana dock in the eastern part of the bay, and Cibil dock, near Lobos point.

The dimensions of Mana dock are as follows: Length, 271 feet; width at entrance, 52 feet. The water is occasionally as high as 18 feet on the sill, and as low as 11 feet. The dock is cut out of the solid rock, and the entrance is closed by a caisson. As the entrance is much exposed, the sea is liable to break over the wall during gales.

Cibil dock has a total length of 450 feet; width of entrance, 55 feet; and depth on sill at ordinary high water, 18 feet.

The dock can be divided into two sections; the first section is 255 feet in length, and the second section 195 feet.

Care is necessary when approaching this dock, especially by the southern channel, which has some rocks near the entrance. Vessels of over 17 feet draft should not attempt to enter or leave the dock until 19½ feet shows on the tide pole at the dock entrance.

The southern channel is deeper than the northern, but the bottom is hard, and the current sets across it from the southward, especially with southerly winds. Two poles with circular discs, at the dockyard, kept in line lead up the channel.

In the northern channel the bottom is soft mud; this channel is to be preferred when leaving the dock, particularly with southerly winds. There are no marks in the dockyard for this channel, but the buoys marking it are sufficient for navigation.

A rock with less than 6 feet water, lies with Cibil dock chimney bearing N. 76° W. (N. 83° W. mag.) distant 580 yards. At 280 yards, S. 64° W. (S. 57° W. mag.) from this rock lies another rock having on it 8 feet water. Between these rocks the ground is generally foul, with depths of as little as 4 to 6 feet rocky bottom in places.

Before entering the dock it would be prudent to sound the approaches, as the depths may vary from time to time.

Supplies.—Water is brought by pipes from the San Lucia river, distant 33 miles, to a reservoir, 6 miles distant from the town, and from thence to the capital. Water is brought off to the vessels when required.

Supplies are cheap and abundant. Several small streams run down the slope of El Cerro.

Coal.—About 10,000 tons of coal are usually kept in stock at Montevideo. There are more than 20 lighters and 5 tugs, by which means coal may be put on board at the rate of 400 tons per day, or 700 tons if working also at night. Bad weather, not infrequent during the winter months, interrupts coaling.

Lights.—A *fixed* and *flashing* light showing a flash *every 1½ minutes* for five seconds, preceded and followed by short eclipse, is exhibited from a brown tower within the fort on the summit of El Cerro, at an elevation of 486 feet above the sea, and should be visible in clear weather from a distance of 25 miles. This light, on account, perhaps, of its great height, is not to be depended upon, and is reported to flash irregularly.

A fixed white light is also shown at 147 feet above the sea by the dial-plate of the clock in the SE. tower of the cathedral. This light is intended to enable vessels to anchor in the outer road at night, by cross bearings of the two lights, but though higher than the lights of the town, it is not brighter, and is difficult to distinguish.

Two electric lights are exhibited in the town of Montevideo, and may be visible for a distance of 25 miles seaward; these lights however, may not be constantly exhibited.

The anchorage for vessels of moderate draft in the road at Montevideo is about 1½ miles SSW. of San José point, in 20 or 21 feet, mud, with El Cerro bearing about N. 30° W., (N. 37° W. mag.), the cathedral N. 54° E., (N. 47° E. mag.) or N. 43° E. (N. 36° E. mag.); and Brava lighthouse S. 81° E. (S. 88° E. mag.). Vessels may anchor farther in as convenient, and those of light draft in the inner anchorage, or northward of town in 9 to 12 feet, mud. In the inner anchorage, on the east side, vessels frequently drag their anchors during bad weather; the holding ground is much better nearer El Cerro. The anchorage near Sarandi point is not safe, on account of the heavy ground swell in that locality, and in case of a pampero the vessel would be on a lee shore.

Vessels with good anchors and cables may anchor safely in the road of Montevideo in the same depth of water as they draw, provided the river is at a mean height, for, whenever the wind sets in from the southward, the water rises sufficiently, and the bottom being so very soft, 3 feet more than the vessel's draft is amply sufficient to ride out the heaviest gale without injury.

Vessels should moor with open hawse to the SW., being the quarter from which the pampero blows strongest. One great evil is the generally crowded state of the small harbor, rendering it difficult to get under way without fouling some other vessel; and even then it is necessary to be towed up towards El Cerro before making sail, by which a steady breeze is gained.

In approaching from the eastward, and unable to reach Montevideo bay before dark, a vessel can anchor southeastward of El Cerro light in 3½ or 4 fathoms of water, and be in readiness to take up a berth when convenient. The bottom near the shore eastward of Montevideo is bad holding ground.

Tides.—It is high water, full and change, 2h. 30m. (approximated); astronomical tides range about 18 inches. The level of the water rises from the effects of wind, ordinarily 4 to 6 feet, occasionally 8 feet; rising with east, SE. and SW. winds, and falling with those from the opposite quarters. The water is sometimes considerably higher at the town than on the opposite side of the bay, and vice versa; there is also a less rise of river noticeable at Montevideo than farther out in the estuary.

An inshore stream runs round Montevideo bay often in the opposite direction to the main stream of the river, and the water forced into the bay by the first part of a strong southwesterly wind is heaped up, and rushes out, three or four hours after the wind has commenced to blow, as a counter current round San José point, causing vessels to ride across the wind, to roll much, and frequently to part their cables and go on shore. The bottom, however, is so soft that they get off again without damage to the hull.

Great care is necessary in standing out from the eastern side of the bay after a pampero has been blowing, as a strong NW. current is often experienced directly Sarandi point is cleared.

Espinillo point, at 10 miles westward of Montevideo, is the southern limit of the mouth of Santa Lucia river. There are some remarkable white patches on the rise of the point. Its extreme is low and rocky, and shoal water, with large isolated boulders, extends ¾ mile to the westward, with 3 to 3½ fathoms close to. Vessels should not approach Espinillo point within a mile, as the currents are uncertain. H.M.S. *Dart*, in 1872, grazed a shoal ot 12 feet depth lying about 2¼ miles west of Espinillo point.

La Panela, a dangerous reef of rocks, 600 yards in extent, and about 3 feet of water over it, lies S. 7° W. (south mag.) distant 5 miles from Espinillo point; and S. 79° W. (S. 72° W. mag.) of El Cerro of Montevideo (position approximate). With a low river, the rocks have been seen above water.

The lead gives no warning of approach to the Panela; all around there is a depth of 3½ and 4 fathoms, mud. A vessel in the vicinity of the reef by day in clear weather, and the lightvessel not in place, should keep El Cerro lighthouse northward of an N. 76° E. (N. 69° E. mag.) bearing until the westernmost white patch on Espinillo point bears eastward of N. 25° E. (N. 18° E. mag.). To pass between Panela reef and Santa Lucia bank, keep the cathedral entirely masked, or El Cerro lighthouse to bear a little eastward of N. 87° E. (N. 80° E. mag.).

Lightvessel.—A lightvessel, with three masts, and painted white, is moored about 200 yards N. 22° W. (N. 29° mag.) of the shoalest part of Panela reef, and exhibits a *fixed* white light, 17 feet above the sea, visible 5 miles. The lightvessel is frequently out of position after bad weather.

Santa Lucia river has its outlet between Espinillo and Tigre points. Its entrance is divided into two passages by Tigre islet, and is encumbered by banks ; coasters only can enter.

At the entrance of Santa Lucia river there is a rock awash, marked by a buoy. The holding ground off the river is good.

Santa Lucia bank is a sandy flat thrown out by the river ; it is ill defined, but its southern extremity, of 3 fathoms, appears to extend 7½ miles from the shore, and about the same distance from Espinillo point.

Coast.—The coast westward of Santa Lucia river is a sandy cliff or Barranca, from 70 to 100 feet in height, extending 22 miles in a westerly direction, as far as Santa Maria or San Gregorio, a dark bluff point, about 100 feet in height, with two or three houses on its summit. This cliff is known as the Rincon de Alcibar. From Santa Maria point, the coast to the westward is much lower, and composed of sandy downs from 20 to 30 feet high for 4 miles, as far as Sandy point, which is low.

Between these two points a small curved sandy spit, having depths of 8 to 12 feet, extends 3 miles off shore ; and at 7 miles southeastward of Santa Maria, about 4 miles off the San Gregorio river, is said to be a shoal spot of 12 feet. Vessels often complete water from alongside in this vicinity ; it is generally as good as that obtained farther up. Fish may be obtained by hauling the seine in the bay between Santa Maria and Sandy points ; and numerous deer, partridges, and wild duck may be shot in the vicinity.

Northwestward of Sandy point, a sandy beach continues, with downs at the back from 30 to 90 feet high, as far as the outlet of the Pereyra and Payon rivers; it offers few remarkable features, except some groups of trees which are seen from the offing, one near the outlet of the Payon, the other half-way towards Sandy point. The entrance to the San Miguel river, 2 miles NW. of Sandy point, is conspicuous at the distance of 6 or 8 miles; the dark brushwood at the entrance being strongly contrasted with the continuous sandhills stretching towards it from Sandy point.

Abreast of Payon river is the limit of the 3-fathom navigation in this quarter. The spit of Ortiz bank here leaves the shore in a SE. direction, and forms a *cul de sac*, named Payon bay, where there is a rather exposed anchorage for vessels in 3½ fathoms, mud. There is, however, an inshore channel, between the great mass of the Ortiz bank and the land, for vessels that do not draw more than 12 feet water, to Colonia, a distance of 37 miles. At the Cufre river, 6 miles beyond the Pereyra, the sandhills become more elevated, rising to 150 feet; and the coast changes from a NW. to a west direction, and so continues to Colonia.

From the Cufre river westward there are three points. The first, Rosario point, formed by the mouth of the river of the same name, is low, and not easily distinguished. Saucé point is easily made out, as it is the most wooded on this part of the coast, and has sandhills 105 feet high, 1½ miles to the north. Rocks, partly uncovered, lie SE. of the point, about ½ mile distant. A small artificial port has been formed at Saucé point; at the end of the pier there are 12 feet water, and less farther in. A cluster of rocks, showing at low water, lie 760 yards from the pier, and is marked by a perch. Coasters may anchor under the lee of this point, sheltered in winds from SE. to north. Artilleria point, at 5 miles west of Saucé point, forms with it a bay of the same name, into the head of which Saucé rivulet empties itself. The sandhills here rise to 150 feet above the sea. Artilleria point is bordered by rocks, which extend 800 yards to the southward.

About 9 miles westward of Artilleria point is the outlet of the Chuelo river, and 2 miles beyond are the Lagunas des Patos, off which the water deepens to 4 fathoms, deepening to 6 fathoms toward Colonia.

Light.—A *fixed* white light is exhibited on a hillock ½ mile north of Saucé point, visible in clear weather from a distance of 4 miles. Not to be depended on.

Pipas rocks, 6½ miles S. 81° W. (S. 73° W. mag.) of Artilleria point, and 2 feet high, lie 1¾ miles off shore, the surrounding reef extending 1½ miles in an east and west direction, with a depth of 2½ fathoms all round. At 1½ miles NE. of the Pipas, and at one mile from the shore, is a reef, which dries; and 1½ miles S. 61° W. (S. 53° W. mag.) of the Pipas lies a rock, with 7 feet water over it.

Colonia is built on the slightly elevated point of a peninsula; the town is dilapidated in appearance, but has a considerable trade in hides and wool. The town is in telegraphic communication with Montevideo and Buenos Aires by means of a submarine cable; also communication by a small steamer, weekly. Meat and game are cheap and plentiful; vegetables and fruit are scarce.

The United States is represented by a consul and vice-consul.

Islets.—Reefs.—San Gabriel island, situated 1½ miles west of Colonia, is low, covered with brushwood, ½ mile long and ¼ mile broad. A reef extends 400 yards from the SW. point of San Gabriel island, and patches of 18 feet lie between 600 and 1,000 yards southward of that point; the outer patch of 18 feet, rock, has depths of 29 to 33 feet within a short distance, and lies with Farallon lighthouse bearing west (S. 82° W. mag.) distant 1⅒ miles. These patches lie in the fairway to Colonia road. A shoal on which H. M. S. *Ruby* grounded, of small extent, with a depth of 9 feet, mean low river, and 17 feet close around, lies with Farallon lighthouse bearing S. 75° W. (S. 67° W. mag.) and the east point of San Gabriel island N. 12° W. (N. 20° W. mag.) distant 450 yards. About 100 yards westward of this shoal is another 9 foot patch. At ¼ mile eastward of San Gabriel is the Laja, a rocky bank, ½ mile in extent, on which the sea breaks in a strong breeze.

Buoys.—A red nun buoy is moored on the NE. end of Laja bank in 12 feet of water, and a black nun buoy ESE. of the bank in 15 feet of water.

There is a small red nun buoy SE. of Los Muleques, which is said to shift with each violent gale.

Farallon is a rocky island 12 feet above the sea, covered with trees; a lighthouse stands near the center. It is surrounded by a reef; isolated patches extend ¾ mile to the northward and northeastward, with 6 to 16 feet water on them; from the SE. side the reef extends nearly 800 yards with a depth of 17 feet at one mile distant. The west end of West Lopez islet shut in with the west end of San Gabriel island leads eastward of the reef.

A rock, having a depth of 15 feet, marked by a black buoy, lies 1¼ miles S. 85° W. (S. 77° W. mag.) from Farallon island; and another of 17 feet at one mile in the same direction.

Lopez islets lie east and west about 2 miles NW. of Colonia; they are bare rocks, 8 and 10 feet high, each in the midst of a long sandy flat, which extends to the NW. beyond Hornos islands. There is a channel between the two islets and flats about 400 yards wide, with about 16 feet of water. Northward of East Lopez islet, a deep bight, runs eastward into the sandy flat, having a depth of 20 to 24 feet, which is named Lopez road.

Beaumanoir reef, with a least depth of 12 feet, lies S. 71° W. (S. 63° W. mag.) from West Lopez islet, and N. 14° W. (N. 22° W. mag.), distant 1½ miles from Farallon lighthouse; it was so named from a French brig that touched upon the rock in working up to Hornos anchorage.

Fishers (Pescadores) bank, the NW. spit of Ortiz bank, forms the shelter to Colonia road on the south. It has patches of 10 to 12 feet towards its NW. extremity, which must be guarded against in passing. This bank is reported to be extending to the westward.

Lights.—From a white lighthouse at Colonia, near the SW. angle of the plaza, is exhibited at an elevation of 110 feet above the sea a white *revolving* light, which attains its greatest brilliancy *every three minutes;* the light is visible, in clear weather, at a distance of 10 miles. The period of revolution is said to be irregular.

Also, from a lighthouse on Farallon island, there is exhibited at an elevation of 84 feet above the sea a *fixed* white light, visible in clear weather from a distance of 13 miles.

The roadstead is well protected by islets and reefs to the westward, except from winds between SW. and SE. It is in some respects a more convenient place for vessels of war than Montevideo. With a southerly gale, which is the only one to fear, the tide invariably runs to the southward, sometimes at the rate of 3 or 4 miles an hour, and thus eases the vessel's cables. The reefs which shelter the road make the entrance difficult, and render it necessary to take a local pilot.

The bar at the entrance to the road is composed of hard sand and rock, with a least depth of 18 feet; the bottom on either side is of soft mud.

Anchorages.—The best anchorage in Colonia roads is with Farallon island in line with the south edge of San Gabriel island, in 4½ fathoms, stiff mud, and on the leading mark; if necessary, moor with open hawse to the SSW. Vessels of 18 feet draft may anchor in 3½ fathoms at ½ mile off shore.

There is good anchorage on the NE. side of San Gabriel island, but vessels should moor. Coasting vessels in this vicinity when overtaken by bad weather seek shelter here.

Pilots.—A pilot boat is stationed about 6 miles SSW. of Farallon lighthouse; her distinguishing marks are a small blue flag with a white square in it during the day, and a *red* light at night. This position is not to be depended on, as she has been found as much as 6 miles farther to the southeastward.

Directions.—In steering for Colonia from the SW., from the main channel of the La Plata, the first object observed will be Farallon lighthouse, then the low flat island of San Gabriel, which is covered with stunted brushwood. For vessels of more than 17 feet draft bring Farallon lighthouse to bear N. 8° E. (north mag.) and steer for it until Colonia lighthouse bears N. 45° E. (N. 37° E. mag.); then steer for Colonia lighthouse until Farallon bears N. 53° W. (N. 61° W. mag.), or until the east end of San Gabriel island is tangent with the west end of San Gabriel island; then steer a course N. 25° W. (N. 33° W. mag.), which will clear the 18-foot lump south of San Gabriel and give ample room for turning to pass through the channel. Stand on the course N. 25° W. (N. 33° W. mag.) until Colonia windmill is over the right hand window of mark house (Italian consul's); then stand on this range until the east end of San Gabriel island is tangent with the west end of West Lopez; then steer S. 80° E. (S. 88° E. mag.) until Colonia lighthouse and windmill are in line; then stand on this range until the west end of East Lopez is tangent with east end of Middle Hornos island; then on this range to anchorage.

In approaching the anchorage the shoal off the NW. point of Colonia should be given a wide berth, particularly on the ebb tide, which is stated to set towards it at the rate of one to 2½ miles an hour.

Hornos islands lie 2 miles northwestward of Lopez islets; they consist of three small low islets lying in an east and west direction, with a channel named the Bergantines, with 15 to 19 feet between the two eastern. The central and western islets are situated on a bank, which further extends in a westerly direction 1,200 yards from the islets; the depths on it are from 10 to 16 feet, rock and hard mud. Near the western extremity of the bank is a rock having a depth of 12 feet. Colonia church open south of West Lopez island leads westward of the rock.

The Hornos islands afford excellent shelter from SW. winds round by south to ESE. The strongest winds are from the westward, but then there is less sea and they are not felt so much as those from SE. to ESE.

The best anchorage is 600 yards N. 14° W. (N. 22° W. mag.) of the western islet, in 18 feet mud. Vessels of war on this station frequently resort to this station to exercise their guns at a target.

Rock.—On October 1, 1888, the steamer *Bellaura* struck and passed over a sunken rock lying about 2 miles westward of Hornos islands. The vessel at the time of striking was drawing 17 feet. Depths of 22 and 23 feet were obtained by the lead just before striking.

The rock is a small patch, with 2 or 3 feet less water than in the channel in the vicinity, not less than 16 feet being found with the river at its normal height. It lies with the Hornos islands almost in line bearing N. 82° E. (N. 74° E. mag.) and Farallon lighthouse S. 31° E. (S. 39° E mag.). Buoys have at different times been moored to mark the rocks but have been stolen, and at present there is nothing to point out its position.

The coast on the south side of the rio de la Plata will now be described.

CHAPTER X.

ARGENTINE REPUBLIC—RIO DE LA PLATA; SOUTH COAST—URUGUAY AND PARANA RIVERS.

Next to Brazil the Argentine Republic is the largest State of South America. Its territory reaches from the slope of the Andes to the Uruguay river; and from the basin of the Pilcomayo river, on the borders of Bolivia, southward for a distance of 1,200 miles to the rio Negro, which separates it from Patagonia. It is estimated to contain 1,125,156 square miles, with an estimated population in 1890 of about 3,456,000. By the treaty of 23d July, 1881, with Chile, Patagonia and Tierra del Fuego were divided between these two Republics. With the exception of the NW. part of the Argentine Republie where the spurs of the Andes reach down to the State, the surface of the country presents vast level plains, broken only by the detached ridges of Cordova and San Luis in the western interior. In the central and southern regions the treeless plains or pampas are covered at most seasons with coarse grass, which is green during the winter months, but dries up in the summer and gives an aspect of aridity to the plains. Some portions of the interior, named Salinas, are barren and white throughout the year.

Climate.—The climate of the Argentine Republic in the far west is warm and dry as far as the slopes of the mountains, where rains are of frequent occurrence; that of the central pampas is wet, while the eastern seagirt portion, including the province of Buenos Aires, is most humid and variable, the changes being brisk and freqnent. The mean annual temperature of the city of Buenos Aires is 61°, the mean of the month of January 79°, and that of August 51°, while the extremes vary between 96° and 35°, the thermometer often falling in a few hours on the result of storms, which are frequent, as much as 50° or 60°. From July to December fogs and rain are apt to prevail, but during the rest of the year the sky is bright, the atmosphere clear, and though rain is not so heavy as in winter, heavy dews supply its place. The autumn from March to June is the most pleasant time of the year, but the summer, though hot, is generally breezy and agreeable.

The alternations of heat and cold are great in the interior plains, and dry, cold winds, called pamperos, blow with considerable violence.

The northern part of the country is exceedingly hot, and in many districts subject to inundations.

The South coast of the rio de la Plata is low, uniform, and uncultivated; the only objects visible from the offing are groups of trees which are scattered along the coast, rendering the navigation near it difficult. This coast is the termination of the pampas of Buenos Aires, immense monotonous plains, which extend to the chain of the Cordilleras, 420 miles to the westward. The only vegetation is an occasional ombu tree, the only large tree which grows in the pampas; it attains a height of from 40 to 50 feet. There is no water but that from the marshes, and the only occasional inhabitants are a miserable tribe of Indians, who sometimes visit the coast for pillage. The great quantity of salt, which is everywhere found on the soil, renders this country uninhabitable.

Cape San Antonio.—Rasa point, the northern extremity of the ill-defined cape of San Antonio, is a low sandy spit; breakers extend nearly 1½ miles northward of it, towards Cabo bank. Near the point is a chain of sandy downs trending to the southward, increasing in height to Medano point, where they are from 65 to 80 feet above the sea. The coast is of light color, with occasional tufts of stunted brushwood, and in clear weather this part of it may be seen from a distance of 8 or 10 miles.

Vessels of moderate draft may approach the cape to a distance of 3 or 4 miles.

Light.—On Rasa point stands a tripod-shaped lighthouse 197 feet high, and painted lead color, from which at an elevation of 190 feet above the sea is exhibited a *revolving* white light *every thirty seconds; flash* of *twelve seconds* and eclipsed *eighteen seconds*, and should be seen in clear weather from a distance of 20 miles.

Tuyu bank, within a depth of 3 fathoms, extends nearly 10 miles from the shore northwestward of cape San Antonio, and the sea breaks on it at one mile from the shore, when the wind is from seaward. The bottom on the bank is extremely soft, the depth decreases gradually, and with the lead going there is no danger.

Cabo bank is the shoal portion of Tuyu bank and is 5 miles long in an east and west direction; its shoalest part, of about one fathom, generally breaks. It lies N. 20° W. (N. 28° W. mag.) about 5 miles from Rasa point.

Tides.—It is high water, full and change, off cape San Antonio at about 10h.; and the spring rise is 5½ feet. In fine weather the tides are regular, but with strong winds from the SE. quarter, the water rises about 3 feet above the ordinary springs, and it falls with the winds from the NW. quarter.

San Boronbon bay, formed between cape San Antonio and Piedras point, 54 miles to the northward, is about 20 miles deep. From the cape the low flat shore, nearly level with the sea, turns to the westward, and northwestward to Juncal island. The coast between is rendered visible at a short distance by the stunted and scattered brushwood growing on the sand. Close to the westward of the cape is the little river Tuyu, communicating with several lakes; coasters of very light draft can enter the river.

The first remarkable group of trees, on Juncal island, is about ¾ mile from the shore; about 7 miles to the northward is the Rodeo clump. In this neighborhood the sandhills begin to rise, though they do not exceed a height of 20 feet. Coasters of light draft will find convenient anchorage off Rodeo, at 2 miles from the shore, in 10 feet, soft mud.

Mount Rosas, 12 miles northward of Juncal island, a sandy down a little higher than the surrounding land, covered with trees, is about 30 feet above the sea. The village of Pampas formerly stood on its summit, the ruins of which still remain.

Salado river.—The Salado is a shallow, bar river, unfit for any but small craft. At times, when the La Plata is high, there is from 6 to 10 feet water on the bar, but at other times it dries. The entrance will be known by the red brickkiln and mount Rosas, southward of it. There are a few houses near the Salado. At one mile off its mouth coasters will find anchorage similar to that off Rodeo.

Five miles northward of the mouth of the Salado is the San Boronbon, a small stream, often dry. The coast between is from 14 to 20 feet high.

Tides.—It is high water, full and change, at the Salado river at 10 h. 45 m.; and the rise is about 6 feet.

Mount Juan Geronimo.—Between the San Boronbon and Piedras point, north of it, is a chain of small sandy downs, on which some trees are seen. The most remarkable is 6½ miles southward of the point, and named mount Juan Geronimo.

Piedras point is the north extreme of San Boronbon bay, and the south point of entrance to the rio de la Plata. The point is low, and projects very little; it is composed of *tufa*, a species of friable compact sandstone, and appearing to be of hardened mud. This stone, known in the country by the name of *tosca*, is formed in various places on the coast, as far as Buenos Aires, and forms a girdle of dangerous banks, 5 or 6 miles mean breadth.

On Piedras point there is a group of trees known as Tala clump.

Piedras bank.—Piedras point, and that of Indio about 12 miles to the NW. of it, is bordered by a bank of tufa and coarse gravel, and within a depth of 3 fathoms, is from 6 to 8 miles in breadth; thence the bank continues along the coast to the NW. at the distance of 7 or 8 miles, gradually narrowing towards Enseneda de Barragan, where it terminates.

Northeastward of Piedras point, the bank extends for a distance of 20 miles, with a depth at low water of about 3 fathoms, and forming a bar to the river. There is a depth only of 16 feet at low river, 11 miles from the point. From the nature of the coast, great caution must be used in approaching it.

As the bank is approached, the cerro de Salvador Grande, on which are some trees, and Tala clump or Piedras point, can be seen.

In estimating with the eye the distance from the coast, great errors are likely to be made; more so when in the La Plata, from the frequent effects of the mirage and extraordinary refraction, which lower and raise considerably the objects in view near the horizon.

Indio point is low and projects but slightly; it may be recognized by a long grove of trees planted in the vicinity of Tufted hill, and now overtops it. The trees are visible from the vessel's deck, about 13 miles distant, and make as an island, being seen some time before any other object on the point. In the immediate vicinity of the point the country is a flat grass plain; a small stream, here, may be ascended by boats at half tide unless the water in the river be very low.

Having passed the point, a continuous line of brushwood of uniform height will be observed for a distance of 18 miles, until Magdalena village is approached, when the scattered ombu trees and slightly rising ground near it are more easily distinguished. It is difficult to make out the different points, as they only slightly project, and the coast can not be approached on account of the banks which border it. By night, it is necessary to navigate with the greatest care when near Indio point, as the currents are strong and the ebb tide sets on to the coast bank.

Tides.—It is high water, full and change, at Indio point at 11h. 45m.; rise about 4 feet.

Lightvessel.—For description of lightvessel off Indio point, *see* page 307.

Magdalena.—When to the NW. of Indio point the most prominent ombu trees seen are in the precincts of Magdalena, and farther on is the little village and church of that name, and it is obscured on many bearings by the trees, and is at all times difficult to make out.

Embuda and Atalaya points.—In front of Magdalena is a slightly projecting point with trees on it, named Embuda. A red brick slaughterhouse, having a lookout place on it, is situated near the point, and a small creek connecting with the river at half tide passes close to the house. Coasters of 4 or 5 feet draft load here with tallow and hides. Atalaya point, at 11 miles to the NW. of Embuda, is low and sandy, and difficult to recognize; the clumps of trees and clusters of underwood, with which the coast is dotted, being similar in aspect. The coast bank extends nearly 4 miles off this point.

Santiago point.—At about 10 miles farther to the NW. is Santiago point, at the entrance to Ensenada de Barragan. The point is low and covered with bushes.

Ensenada de Barragan, situated about 10 miles west of Atalaya point, is open to the WNW., and is only available for small craft, with local knowledge. A spit dries off Santiago point, the eastern extreme of Santiago island, in a WNW. direction for the distance of ½ mile, The channel south of the spit is about 100 yards wide, and the depth on the bar at low water is from 3 to 8 feet. The channel is marked by three buoys, which should be left on the starboard hand. The inlet was formerly deeper and more frequented, but from the accumulation of mud the water is shoaling daily; its shores on either side are swampy, thickly wooded, and intersected by numerous creeks. In the middle of last century large vessels unable to go Buenos Aires entered this inlet. At that time there was a depth of about 16 feet on the bar at low water, and 6 to 10 feet where ground is now dry.

Ensenada is connected by railway with La Plata, Punta Lara pier, and Buenos Aires.

Harbor works.—From Santiago village, situated at about 1¾ miles eastward of Santiago point, there are two piers 330 yards apart, and 2¼ miles in length in a N. 25° E. (N. 17° E. mag.) direction. Their extremities curve towards each other, leaving an entrance about 220 yards in width. A channel dredged to the depth of 23 feet (in 1890 the depth was 21 feet), will be continued up the canal as far as the docks. These docks are distant 4¾ miles from the pierheads, and the city of La Plata lies about 3 miles above the docks.

The services of a pilot are necessary for entering the port, no vessel of any size being permitted to enter without one. The two piers, extending out into the roads, form the entrance channel to the docks. From the outer entrance of the channel to the head of the Dique de Maniobras (at south end of the Grand dock) there is a depth of not less than 21 feet.

In the Puerto Rio Santiago there is a depth of 21 feet from east side of the entrance channel to the Puerto Occidental.

The south half of the Puerto Intermedio has a depth of 21 feet; the remainder is not yet constructed.

In the Puerto Occidental there is a depth of about 18 feet, and throughout the length of the Canal Lateral Oeste, to and including Dique No. 1, from 6 to 7 feet.

The Canal Reunion Oeste is nearly completed, and small boats pass through it. The Canal Lateral Oeste, Puerto Oriental, Canal de Conclusion, Dique No. 1, and Canal Reunion Este are under construction.

It is proposed to increase the depth of the Canal Este to 16 feet, and the width to 22 yards.

Eight large warehouses are completed, and are in use in Puerto Rio Santiago, between the Canal de Entrada and Puerto Occidental. The railway runs on both sides of the dock, and thence to La Plata. At the berths where large vessels are moored in Grand basin the depth is 25½ feet.

During a heavy gale on May 2, 1890, the water was blown out of the river, producing the lowest water known for seventy years. At its lowest there was a depth of 21¼ feet in the deepest part of the dock, where vessels are moored, and about 17½ feet in the rest of the dock and in the channel. With no abnormally high tides the deepest water noted in the Grand dock was 31 feet.

Coal.—Vessels can coal with facility on both sides of the dock by movable steam cranes, and from lighters on the off side.

Santiago.—Santiago village is built of wood, and inhabited chiefly by the workmen employed on the piers and canal.

Lights.—A fixed *red* light is shown from the extremity of the eastern pier and a fixed *white* light from the extremity of the western pier, visible 3 miles.

La Plata, the new fortified capital of the province of Buenos Aires, created by law, and the foundation stone laid in 1882, was inaugurated in April, 1884, the public departments being removed thither from Buenos Aires. The city contains 40,000 inhabitants, and is lighted by electricity. Two of these lights are at a considerable elevation, and may be seen from a distance of 22 miles and the glare of them for some distance further. The column of the higher one stands near the center of the city, and is a conspicuous object by day, in clear weather appearing from a distance of 10 miles like a tall chimney standing upon an even topped range of hills, but which, in reality, is a plantation of eucalyptus trees.

Time signal.—The signal is a ball, which is dropped daily at 11h. 0m. and 11h. 3m., La Plata observatory mean time, equivalent to 2h. 51m. 37s. and 2h. 54m. 37s. Greenwich mean time. Approximate position, La Plata observatory: Latitude, 34° 54′ 30″ S.; longitude, 57° 54′ 15″ W.

Santiago bank, with a least depth of 7 feet, lies westward of the approach to Ensenada; its outer edge is 3½ miles northeastward of Punta Lara pier.

Directions.—When approaching from the eastward, having cleared Chico bank, steer (allowing for current) to sight Santiago piers a little on the port bow. There is anchorage about 400 yards off the extremes of the piers in 20 to 28 feet, depending on the height of the river, in muddy bottom. When approaching from the northwestward, give Santiago bank a good berth.

Punta Lara.—A railway pier 2,845 feet in length, with machinery for loading and discharging cargoes, has been constructed 3 miles to the westward of Ensenada harbor, or about midway between that place and punta Lara; at the outer end of the pier there is a depth of 16 feet at low water, soft muddy bottom, but strong southwesterly winds decrease the depth to 14 feet. Vessels drawing 16 feet water can unload alongside the pier, as there is a depth of 5 feet of soft mud, but it is advisable to haul off with northerly winds, as vessels have sustained damage.

It was proposed to construct a breakwater for the protection of Punta Lara pierhead.

This place, included in the port of Ensenada, was opened as a port of entry in 1874.

Anchorage.—Punta Lara road, situated between punta Lara and Punta Lara pier, with depths from 16 to 18 feet, is recommended as a good winter anchorage for vessels of moderate draft, being protected from winds to the southward of east and west, which are the most dangerous on this coast; northerly winds appear to have little or no effect on the anchorage, as the sea is broken by the outlying banks. A good position is with Santiago poplars bearing S. 48° E. (S. 56° E. mag.) and the red house at punta Lara S. 10° E. (S. 18° E. mag.).

Vessels drawing 13 feet can enter Punta Lara road at low water. The channel is buoyed by the railway company, who have also laid down several screw moorings off the pier.

Directions.—Vessels intending to go alongside the pier should, on arriving at the old anchorage off punta Lara, apply to the authorities for a pilot. No charges will be made except for the transport of merchandise by rail. The services of a tug are available.

Communication can be had by railway twice a day between Ensenada, Punta Lara pier, and Buenos Aires.

Tides.—It is high water, full and change, at Ensenada de Barragan at about 7h.; and the rise is stated to be from 5 to 9 feet.

Quilmes point.—Lara bank.—At 9 miles to the westward of punta Lara is Quilmes point, in approaching which the rising edifices of Buenos Aires and the vessels at anchor in the outer road will be seen. Between Ensenada de Barragan and Buenos Aires the low grassy shore is partly inundated with a very high river.

Lara bank, of 2 fathoms, lies 4 miles off shore and the same distance NNW. of punta Lara; it must be guarded against in approaching Buenos Aires.

Palmas flats is a great bank formed of the sand brought down by the Uruguay and the Parana, and deposited over the whole of the upper part of La Plata. The depths over its outer part are from 2¼ to 2¾ fathoms, over its inner part from 1¼ to 1¾ fathoms, and shoaling still more near the mouths of the great rivers.

Vessels leaving the outer road of Buenos Aires for Colonia should take into consideration the vessel's draft and state of the river, and steer to the eastward, if necessary, to round the flats in the deeper water. Farallon light, N. 53° E. (N. 45° E. mag.) or northward of that bearing, leads clear, in about 3 fathoms of water.

Buenos Aires, formerly the capital of the province of the same name, was founded in 1535, and stands on the right bank at the head of the estuary of the rio de la Plata, on a vast plain, which is here about 35 or 40 feet above the sea and which extends westward to the Andes. The level uniformity of its outline is only broken by the spires of various churches. The streets are regular and straight, intersecting each other at distances of about 150 yards, and forming squares. The houses have never more than two stories, and commonly only one. In 1890 the population of Buenos Aires was estimated at about 561,160.

The city is the seat of government, of an archbishopric, and of all the diplomatic representation accredited to the Republic. The cathedral has a handsome dome and a portico with twelve Corinthian pillars.

There are several churches, including two English, and a Presbyterian chapel.

Buenos Aires is connected by railway and telegraph with all the principal towns, and by submarine cable with Europe. International communication is kept up by the employment of nearly 1,000 steamers. The imports are manufactured goods, cottons, earthenware, gunpowder, hardwares and cutlery, iron, leather, linens, oil, linseed, woolens, etc.; and the exports are bones, copper (unwrought), grease, horsehair, hides, horns, skins of various kinds, tallow, tobacco, wood, etc.

The United States minister resides here. There is also a consul and vice-consul.

Supplies.—Coal.—All kinds of supplies are obtainable at Buenos Aires. From 4,000 to 5,000 tons of coal are usually kept in stock, and coal can be put alongside in lighters at the rate of about 100 tons per day. Coaling is more expensive and much slower here than at Montevideo, and as the draft of water of vessels, which must of necessity cross the bar of the river, near Indio Point lightvessel, must be considered, they usually coal at the latter place. During summer, when strong SE. winds prevail during the day, communication with the shore is impeded. At all times of the year coaling is liable to interruption.

True bearing.—From San Miguel tower, 68 feet high, a little westward of the cathedral, the true bearing of the north Cerro de San Juan on the Banda Oriental coast is N. 39° 41′ 34″ E.

Harbor works.—At 1½ miles southward of the city is the Riachuelo river, the commercial port of Buenos Aires. Two piers, each about 450 yards in length, form the entrance to the "Boca," as the dredged out portion of the Riachuelo is locally termed.

A channel 200 yards wide with a least depth of 16 feet has been dredged in a line S. 71° W. (S. 63° W. mag.) to the entrance piers. This channel is marked by pile beacons and buoys, red on the starboard hand and black on the port hand when entering. A fixed light is exhibited on the outer beacon (on starboard hand) entering. The river is subject to sudden changes, and vessels of large draft are frequently obliged to wait for a favorable opportunity to enter the Boca.

From the inner end of these piers the bed of the Riachuelo has been deepened for nearly 2 miles, the north bank lined with wooden wharves, and the width of the stream increased. The upper part in the vicinity of the railway and tramway bridges is named Barraccas.

A vessel of the Netherlands-American Steam Navigation Company (1890)—was taken into the Boca drawing 21 feet 8 inches, but was obliged to be lightened to 17 feet 9 inches, and to wait eight days for rising water to come out.

Docks.—South Basin—length about 3,600 feet; width, 385 feet; width of entrance, 225 feet; depth on sill, 21½ feet. This basin, opened 28th January, 1889, is entered from Riachuelo channel. No. 1 wet dock, opened for traffic in January, 1890—length, 1,870 feet; width, 525 feet; width of entrance, 66 feet; depth on sill, 21⅔ feet. No. 2 wet dock—length, 1,870 feet; width, 525 feet; width of entrance, 23¾ feet. No. 3 wet dock—length, 2,265 feet; width, 525 feet; width of entrance, 66 feet. No. 4 wet dock—length, 2,065 feet; width, 525 feet; width at entrance, 66 feet. North Basin—length, 1,465, feet; width, 1,130 feet; width at entrance, 260 feet; depth on sill, 21 feet. All the docks and basins are connected by railway.

A dock 300 feet long, 51 feet wide, and 11 feet deep over sill at high water ordinary springs, and which has taken a vessel drawing 14 feet, is situated at San Fernando, about 15 miles above Buenos Aires, eastward of the mouth of the Tigre river. The channel to this private dock has about 13 feet at high water.

Port charges for entering the basin: All ocean going vessels, 10 cents per ton register for the first seven days and 1¼ cents for subsequent days; river steamers of 50 meters and less in length, $10 per diem; upward of 50 meters and less than 75, $15; upward of 75 meters and less than 100, $20; upward of 100 meters, $25 per diem. To this 50 per cent will be added for loading or discharging.

Men-or-war are berthed by the harbor master near the entrance.

Lights.—A fixed white light is shown from the tower of the customhouse at Buenos Aires. Visible 4 miles.

From the outer extremity of each of the two stone piers at Riachuelo there is exhibted at an elevation of 43 feet a fixed *red and white* light. Visible 5 miles.

When a vessel is on the line of the dredged channel both lights will appear white, but when out of the line of the channel the nearer light will appear *red* and the farther light *white.*

Lightvessel.—At one mile S. 22° W. (S. 14° W. mag.) of Boca entrance pile beacons a hulk or stationary guard ship is moored in 16 feet water. The vessel is painted black, has three masts, and shows a *fixed* white light about 20 feet high. Visible 6 miles.

Anchorages.—Outer road.—Bar anchorage.—The Outer road of Buenos Aires is a remarkable depression of the bed of the river eastward of the city bank. The northern portion is between that bank and the Camaron, a tongue of the great Palmas flat. It is about 3½ miles from the shore, 3 to 4 miles in length in a NW. and SE. direction, and from ½ to ¾ mile in breadth, with depths of 18 to 22 feet over soft mud, the shoal water being toward the east and west extremes. The approach to this anchorage is over a bar or flat with only 15 feet water on it at the mean level of the river, and at times not more than 12 feet, which obliges vessels of moderate draft to anchor at about 8 miles from the town in about 21 feet water, with the guard lightvessel about west, distant 3 miles. This latter position is known as the Bar anchorage. The Royal mail and other large steamers use this anchorage.

From the Bar anchorage the soundings gradually decrease to the bar. Having passed the lightvessel, a N. 60° W. (N. 68° W. mag.) course for 2 miles will lead to the southern part of the outer road, the soundings gradually increasing, and the bottom becomes softer.

From the middle of this road, Riachuelo Pier lights bear about S. 14° W. (S. 6° W. mag.) and Recoleta church S. 61° W. (S. 53° W. mag.), with a depth of about 21 feet. It is not usual to moor in the outer roads, but to veer a long scope of cable and be ready to drop a second anchor with southeasterly winds.

These roads are exposed to winds from SE. to ENE., which often bring in a heavy ground swell. Vessels frequently drag, foul each other, and sometimes go on shore. It is necessary to have good ground tackle; also to avoid grounding on their anchors, or on those of vessels in the road. The bottom is a fine, dark sand; within the 12-foot line of soundings it is generally hard, and from 12 to 15 feet, hard and soft; beyond 15 feet it is mostly soft, muddy sand.

Vessels are liable to ground in low river, but as the bottom is soft, it is seldom the cause of damage.

Loading or discharging cargo is prohibited in the outer road; should, however, there not be sufficient water for vessels fully laden to proceed out of the docks, the loading may be completed in the outer road.

Vessels of heavy draft that can not enter the docks, must proceed to the port of La Plata.

Wrecks.—There are many wrecks in the rio de la Plata. The charts show the positions of most of them but as they are apt to shift their positions and as there may be others not charted, a good lookout for them must be kept and the greatest caution observed in picking out a berth for anchoring.

Inner road.—The Inner or Little road, off the NE. angle of the city, is a space of about 1½ miles in length, in a NNW. direction, and about 600 yards in breadth, having 12 and 13 feet water. It is formed between the City bank and the coast; the latter is bordered with a bank of rotten stone. Northward of the Inner road is the anchorage El Pozo, having about a foot more water. Vessels in the Pozo and Inner road always moor NE. and SW., and great attention should be given to prevent grounding on the anchors, for frequently there are only depths of 8 or 10 feet, and vessels are often aground and unable to go to sea for fifteen or twenty days. As the fall of the river depends mostly upon westerly winds, vessels should have a good scope of cable on the east anchor.

In proceeding from the Outer to the Inner road, steer N. 47° W. (N. 55° W. mag.), until the church of Recoleta bears S. 26° W. (S. 18° W. mag.), then steer on this line across the west part of the City bank over soft bottom, in from 10 to 13 feet water, at the mean level of the river, until 1½ miles from the shore; when about a S. 21° E. (S. 29° E. mag.) course will lead to the anchorage. The depths of water over this part of the bank are about the same as elsewhere, but this track is chosen by the heavier vessels, on account of the soft nature of the bottom; it is 4 miles longer than the Catalina.

The Catalina channel, southeastward of the above, is a slight depression in the City bank, but the bottom is harder; it is much used by vessels under 10 feet draft. A red buoy, with black band, is placed at the outer extremity of the channel and on the south side of it, in 10 feet water.

It is advisable when going to the Inner road to employ a pilot, particularly for the purpose of choosing a clear berth and avoiding the many lost anchors in the roads.

Quarantine regulations.—Vessels of less than 19 feet draft will not be considered as having entered the port, nor be visited by the health officer unless westward of the line of Quilmes church bearing S. 43° W. (S. 35° W. mag.). If of greater draft, hoist a flag at the yardarm, when the health officer will come off.

A red buoy is moored eastward of Bar anchorage in latitude 34° 37′ S., longitude 58° 5′ W., to mark the quarantine ground, beyond which a vessel may not approach, if there be any doubt about the sanitary condition of ship or crew.

Landing.—In the roads of Buenos Aires during summer, when strong SE. winds prevail during the greater part of the day, the sea is so rough that communication with the shore is impeded; but during the winter when the winds are generally from the SW. or NW. the sea is smooth and communication easy.

Tides.—It is high water, full and change, at Buenos Aires at 6h.; springs rise about 4 feet. The time of high water is regular, but the height is affected by the winds. The flood runs 5h., and the ebb 7h., at from one to 2 miles an hour. The winds from the SE. cause the water to rise, and those from the NW. depress it, and in some places cause a difference of 12 feet. A case has occurred when the wind from the NW. has so depressed the water that a person was able to walk dry to the vessels anchored in the Inner road.

.**Wind and weather.**—During summer, between August and March, the winds are from the eastward. About noon, if the barometer be in a mean state, there is generally a calm or little wind which freshens from the southeastward towards sunset when it blows fresh, veers to the northward during the night and becomes calm again about noon. In April, May, June, and July the weather is variable. The barometer always rises with a SE. wind, which brings clear dry weather; falls for a pampero or SW. wind, but falls lowest with the wind from north to west, which brings cloudy rainy weather. It may be fine weather at sunset and two hours after blowing a gale, but the barometer is sure to indicate it. For full description of the winds and weather in the rio de la Plata see pp. 315–320.

Coast.—From Retiro point, at the NE. angle of Buenos Aires, on which are the gas works, the shore forming Olivos bay, trends northwestward for 9 miles to the point of that name, a bluff 62 feet above the sea. At 2 miles westward of Buenos Aires is Palermo, formerly the palace of Rosas. The village of Belgrano stands on some high level ground 1½ miles inland. Some streams empty themselves into the bay. At 6 miles NW. of Olivos point, is the mouth of the little river Tigre, where commences the delta of the Parana.

Amarga point—Light.—A *fixed* white light is exhibited from Amarga (Olivos) point, about 9 miles northward of Buenos Aires, at an elevation of 32 feet above the level of the river, and visible in clear weather from a distance of 5 miles.

Tigre river.—Vessels of less than 8 feet draft can navigate to the Tigre, where there is an excellent port and dock and where small craft may beach for repairs. In strong winds from the SE. many small craft leave the roads of Buenos Aires to seek shelter there, but it is necessary to have a good pilot, as the channel is winding and subject to frequent change. There are in places 13 or 14 feet water, but the deepest is off the shore forming Olivos point, where there is a depth of from 12 to 17 feet.

Above the Tigre the shore trends northward and completely changes its appearance. It is broken by a great number of little rivers, outlets from the Parana, forming sunken islets covered with wood. Of these outlets there are three more frequented by small craft than the others, the Arroyo del Capitan, the Parana de las Palmas, and the Boca del Mini; but, although reputed to be deep, they are generally too narrow and winding to admit of easy navigation.

APPROACHES TO RIO DE LA PLATA.

In approaching the rio de la Plata, discolored water, caused by the outpour from the river, will be met with at the distance of from 60 to 75 miles; the bed of the river is formed of layers of soft mud, which is the best guide for a vessel when the land is not seen, the bottom being more or less soft in the channel, and more or less hard on the banks.

Pilots, if required, will be found off cape Castillo. They are licensed by the Argentine Government, and merchant vessels are required to employ them or pay the pilotage.

La Plata bank.—At the entrance to the rio de la Plata, between the meridians of Maldonado and cape Castillo, is a remarkable bank, with depths of from 10 to 20 fathoms, fine sand and broken shell. It extends in a NE. and SW. direction parallel to the coast, at a distance of from 40 to 50 miles. At 25 miles eastward of Lobos island it is a part of the bank extending from the shore; thence eastward it is separated from the shore bank by the Mudwell.

This Mudwell has depths of 18 to 40 fathoms, with some patches of 15 and 17 fathoms.

Soundings of 17 to 19 fathoms are found nearly 50 miles SE. of Palmar point, evidently a continuation of La Plata bank.

It has long been known that there were detached sandbanks at the entrance to the rio de la Plata, but the different positions assigned had caused some of them to be considered doubtful. At the present day numerous observations have shown the existence of several shoals, all lying in the same straight line parallel to the coast, and proving to belong to the same bank. The great length and narrow shape of La Plata bank explain clearly the different positions assigned to these shoals.

As accumulated evidence points to the possibility of the existence of other small knolls at the entrance of the rio de la Plata, the mariner should use every precaution in navigating this vicinity, and especially keep his lead going.

Mudwell.—The Mudwell is a very marked depression of the ocean bed between La Plata bank and the coast of Uruguay, the bottom of which (as its name implies) is mud. It is of the consistency of sticky clay, and varying in color in different parts from that of lead to a bluish black.

This mud channel commences south of Maldonado light, distant about one mile from the coast, and is at this point 11 miles wide. It maintains this width, excepting at one or two points near cape Santa Maria, outward to cape Castillo, where its distance from the coast increases to about 25 miles. Its general direction is about NE. by E.

English bank is a dangerous bank of tosca, lying in the entrance to the La Plata. It is 20 miles in length within a depth of 5 fathoms, in a NE. and SW. direction, and 5 miles maximum breadth. Its northern end, 4 miles in extent, north and south, dries in places and the sea continually breaks on it.

From the northern extremity, Flores Island lighthouse bears N. 3° W. (N. 11° W. mag.), distant 11 miles. Masts of wrecks may generally be observed on the bank.

There are depths of 6 and 7 fathoms close to the north end of English bank, and the soundings are found to be regular off the eastern side of it; if common precautions be taken with the lead, the approach towards the bank will be indicated. To the northward of the bank the depth will not be less than 7 fathoms until westward of its meridian. Should a vessel have occasion to anchor near it, the anchor should not remain long in the ground, as from the stiff nature of the bottom there will be great difficulty in lifting it.

The currents in the vicinity of the bank were observed to set in all directions, but generally more towards the east and west than towards the north and south; the greatest rate observed did not exceed 1½ knots an hour.

Lightvessel.—About ½ mile off the north end of English bank, in about 7 fathoms of water, is a vessel painted red, having two masts, and which exhibits a *fixed* white light visible 12 miles in clear weather.

The lightvessel drags from time to time during heavy gales, and it would seem is generally left in the position to which she drifts. No confidence therefore can be placed in her as a guide to clear the bank;

and as the jib and spanker are sometimes set to keep the vessel steady, it is then difficult for a stranger to recognize her as a lightvessel.

Archimedes bank lies about 6 miles westward of English bank, with depths of 4 to 5 fathoms between. It extends over a space of about 4 miles, with a least depth of 2½ fathoms, sandy bottom; northward and westward of it the bottom is mud, or sand and mud. It should not be approached, unless in a vessel of light draft, nearer than 5 fathoms water. Within 6 miles of the west side of this bank there are depths of 3 and 3½ fathoms.

Rouen bank is situated on the meridian of 56° W., and its northern extremity is about 24 miles southward of the center of English bank. Within a depth of 5 fathoms, it is about 10 miles in length, north and south, by about 4 in breadth. The least water found was 3½ fathoms, black sand, but less water may exist.

Astrolabe bank, formerly shown on the charts, eastward of Rouen bank, is by recent examination absorbed by the Rouen bank.

Wrecks.—A conical buoy has been placed in 3¼ fathoms, 100 yards eastward of the wreck of the *Senegal*, with Indio Point lightvessel (if in position) bearing N. 82° W. (W. mag.), distant about 16 miles.

A sunken wreck, in a position dangerous to shipping, lies with the following approximate bearings: Flores Island lighthouse N. 30° E. (N. 22° E. mag.), about 7½ miles, and Brava Point lighthouse N. 46° W. (N. 54° W. mag.).

Other wrecks are known to lie respectively N. 5° E. (N. 3° W. mag.), distant 12 miles, and S. 88° E. (N. 84° E. mag.), distant 22½ miles from Indio Point lightvessel; also at S. 55° W. (S. 48° W. mag.), ¼ W., distant 2¾ miles from Punta del Este lighthouse. (See cautionary remarks regarding wrecks, page 303.)

Cuirassier bank is about 3½ miles long in a NW. and SE. direction, about ½ mile broad, and has from 17 to 18 feet water on it, the bottom being sand and mud, and in the shoaler places hard sand. There is a channel 3 miles wide on either side of the bank, with depth of from 3½ to 3¾ fathoms, mud. As the Cuirassier bank has as much water on it as the tail of the Ortiz bank, over which vessels ascending or descending the river must pass, it can scarcely be considered a danger.

Lightvessel.*—Between Indio point and Ortiz bank (about 2 miles southward of Cuirassier bank), a vessel painted black is moored in 3½ fathoms, with Indio point bearing S. 50° W. (S. 42° mag.), distant about 11 miles.

This vessel, locally known as Indio Point lightvessel, has three masts, and exhibits at the height of 30 feet above the sea, a fixed white light, and in clear weather should be seen from a distance of 10 miles.

---

* Temporarily replaced by a lightvessel showing an intermittent white light, visible 15 seconds and obscured 6 seconds. The lightvessel is moored with Indio point bearing S. 44° W. (S. 36° W. mag.), distant 9 miles. The light is elevated 43 feet and in clear weather should be visible 14 miles. Chico Bank lightvessel has been temporarily replaced by Indio Point lightvessel. These changes may be made permanent.

A small white light is shown from the peak.

This lightvessel often drifts from her position, and if much displaced returns to it, mooring on the same bearing, but her distance from it may vary considerably, as they have no means but estimation of ascertaining the distance from shore, nothing but the grove being seen from the lightvessel.

Pilots.—When pilots are on board, a blue flag with a white letter P is hoisted.

These pilots are licensed by the Argentine Government, and merchant vessels are required by the port regulations to employ them, or to pay the pilotage.

Ortiz bank, which is imperfectly known, begins near Colonia; thence it borders the coast to the eastward, as far as the outlet of the rivers Payon and Pereyra, a distance of about 37 miles, and extends in a tongue to the southeastward across the La Plata, the shoal parts from 9 to 10 feet terminating 15 miles N. 42° E. (N. 34° E. mag.) from Indio point, and about 56 miles from Colonia. This portion, which was examined in 1871, near the shoal water above mentioned, appears to have an average breadth of only 3 miles and to extend parallel to the shore for 20 miles, thence in a SW. direction to Piedras point and joining the shore bank. This portion may be termed the bar of the La Plata, and is about 9 miles across, with a depth of about 18 feet at low river. In the center of Ortiz bank the depths vary from 9 to 15 feet, and along its north part, at 4 miles from the shore, the bottom is remarkably level, the depths being from 2 to 2½ fathoms.

The bottom is sand, or rock covered with sand, which the seaman should take into consideration in crossing with a vessel of light draft, as well as the state of the river. The bank may be approached on all sides by the lead, the soundings gradually decrease, and the mud (found in the channel) becomes mixed with sand; the only fear is getting in one of the indentations of the bank more or less deep, and known by pilots under the name of saccos. A vessel should not go nearer than 3 fathoms water.

Ortiz bank forms two channels, one northward of the bank, and close along the north coast, which is practicable for vessels of about 12 feet draft. The other, southwestward of the bank and northward of Chico bank, is more frequented, being the main channel between Montevideo and Buenos Aires.

Chico bank lies in the middle of the channel between Ortiz bank and the coast of Buenos Aires, and is a series of small banks of hard sand, about 15 miles long in a NW. and SE. direction, nearly joining the shore bank, the depths upon which vary from one to 3 fathoms, with narrow channels of 3 and 3½ fathoms between; these banks are steep-to on the northeastern side.

The main channel, between Chico and Ortiz banks, has from 4 to 6 fathoms water, muddy bottom, which is carried as far as Santiago point; from thence the soundings decrease gradually to about 2½ fathoms at the bar of Buenos Aires.

Southward of Chico bank there is a channel of about 3 miles in breadth, navigable for vessels under 15 feet draft, but it is not recommended, as the currents run strong, and the soundings in approaching the banks are not a sufficient guide.

Lightvessel.*—A lightvessel painted red, with three masts, is moored in 4½ fathoms water northward of Chico bank, near the edge of the bank. The vessel exhibits a *fixed* white light, visible 10 miles. Besides the regular light a small white light is shown at the peak. The vessel is liable to drag, and frequently out of position after gales.

Tides.—In the vicinity of the Point Indio and Chico lightvessels, in ordinary weather, the average rise and fall is 4 feet, the ebb setting to the SE. at the rate of from ½ to 3 miles an hour and the flood to the NW. at from ½ to 1½ miles an hour.

The coast banks, fronting the south shore of the La Plata, have been described in connection with the coast.

General directions.—Making the land at the entrance of the rio de la Plata does not present any great difficulty. The inconvenience is caused by the frequency and suddenness in the changes of the weather. The latitude is of the greatest importance, and no opportunity should be lost in obtaining it, either by day or night, whenever the state of the weather will admit, and, with the lead, the vessel may be navigated with safety.

In fine weather, and coming from the northward, with northeasterly winds, the lighthouses at cape Polonio (Castillo) and Sta. Maria will be sufficient to identify the coast.

In hazy weather a good parallel for making the entrance is on the parallel of Lobos island, and when in the longitude of about 53° 10′ W. the La Plata bank will be struck in depths of from 12 to 20 fathoms.

The bank here is about 10 miles across; then the Mudwell will be reached, in which the depth is generally over 20 fathoms.

Having crossed the Mudwell, and steering toward the coast, the following changes in the character of the bottom will be observed: First, mud and sandy grit; next, mud and shell; and finally, sand and shell. The sand becoming quite coarse, changes color, and is mixed with gravel or pebble and colored shell as the coast is neared. In thick weather the water should not be shoaled to less than 15 fathoms.

Allowance must be made for the current according to the direction and force of the wind, bearing in mind that with the wind from the SE. it sets strong toward the coast.

If set to the southward, the bottom will be fine sand. A muddy bottom is a sure indication of being in the fairway.

---

* See footnote, page 307.

Several vessels are yearly wrecked on the English bank by not paying attention to the lead, and particularly to the nature of the bottom. To the westward of Lobos islet, with a scant or beating wind, the north shore should be kept aboard, as it is bold; there are no outlying dangers at the distance of 5 miles from it, and the weather is seldom so thick for any length of time that the land can not be seen. The nature of the bottom is mud, and the decrease of soundings to the westward will indicate an approach to Flores lighthouse. With a fair wind, if a vessel be to the southward, out of the channel, the bottom will be gray or black sand and shell, especially near the English bank.

With a steady NE. breeze cape Castillo should be sighted, when the vessel, aided by a favorable current, can run along the land. If, however, the wind be from south to SE., or the weather be uncertain, by sighting the cape a vessel will be to leeward, with a strong current against her and a heavy swell setting towards the coast. It would therefore be necessary, with south or SE. winds, to keep a little southward of the parallel of Lobos, and steer so as to sight that islet in a west or NW. direction.

In bad weather attention must be paid to the soundings over La Plata bank and Mudwell, and the river should not be entered before a vessel's position is well ascertained by sighting Lobos or the surrounding lands.

If caught in the entrance with a SE. gale, and unable to reach a port, it will be prudent to anchor on muddy bottom, under the lee of any sandbank. If eastward of Lobos isle, the vessel will be set rapidly towards cape Castillo, where shelter will be found from winds southward of SSE., on the north side of the cape, or she may stand off shore until the return of fine weather.

In entering the rio de la Plata southward of the English bank the seaman should be certain of his latitude, and steer on the parallel of about 35° 35′, northward of the Rouen bank, taking into consideration the state of the wind and sea; or run on the parallel of 36°, south of the Rouen, avoiding the space between, in which French bank and others have been reported. Westward of Rouen bank, a course must be shaped for the desired port according to position, as in the absence of marks the bottom and soundings are the only guide.

Westward of these banks, and of the meridian of Montevideo, the bottom is mud, with the exception of the tosca off Piedras point, and Ortiz bank, which is sand.

As cape San Antonio, the south point of entrance, is low and seen only at the distance of a few miles, a vessel from the southward, in the absence of observations, must depend entirely on the lead; and in proceeding for Buenos Aires, the (Indio point) lightvessel will probably be the first thing seen, at a distance of 6 or 8 miles.

Caution.—The lights of vessels at anchor must not be mistaken for those of the lightvessels, although this is frequently said to occur.

Also, some care is required in selecting pilots, for, although licensed by the superintendent of the port of Buenos Aires, it is to be feared there are many who are not competent to undertake the navigation of the river. Wrecks are frequent, but the pilots are seldom or never made to feel their responsibility.

Montevideo to Buenos Aires.—It is customary for vessels from Montevideo to Buenos Aires to employ a pilot, and unless the mariner has some knowledge of the navigation of the river, it is almost indispensably necessary for those of more than 16 feet draft; for although the channel is marked by Indio point and Chico lightvessels, at certain places it is narrow, and the lightvessels are liable to be considerably out of position. The pilots alone can be acquainted with any changes, but too much confidence must not be placed in them, and great attention should therefore be given to the navigation even with a pilot on board.

Vessels of less than 9 feet draft can almost always steer across Ortiz bank in a direct line. In proceeding through either channel it must be borne in mind that when in the fairway the bottom will be soft mud and the nearer the banks are approached the more the mud will be found mixed with sand, and the bottom harder, as near all the banks sand predominates. Should a vessel's position be doubtful in consequence of thick or bad weather, she should anchor. Eastward of the meridian of Flores, a vessel should anchor only during fine weather; but westward of that meridian, she may anchor without the least inconvenience, when the bottom is mud. Near the banks in the rio de la Plata, generally the bottom is a mixture of black mud and sand, overlying stiff clayey mud.

North channel is frequented by coasting and other lightdraft vessels. Leaving Montevideo for this channel, and having passed Panela rock and the south extremity of Sta Lucia bank at a prudent distance, steer along the land, passing Santa Maria and Sandy points at the distance of 4 or 5 miles, and when the soundings increase from 3½ to 4½ fathoms a vessel will be off the bank extending southward between the two points. When Santa Maria point bears N. 76° E. (N. 68° E. mag.) distant about 6 miles, a course N. 37° W. (N. 45° W. mag.) along the shore may be taken, passing about 2 miles southward of Pereyra river; westward of this river the water decreases. Off the Cufre the depth is about 16 feet, which should be passed at the distance of 1½ or 2 miles.

On arriving off Saucé point, which is more woody than the others, a course about S. 81° W. (S. 73° W. mag.) should be steered, so as to pass southward of Pipas rocks and the rock to the southwestward; having passed them, the land may be closed by the lead to within ½ mile, steering along it for Colonia roads. The soundings, from about 4 miles west of Pipas rocks, will increase to 4½ fathoms, and at less than ½ mile southward of Colonia to 7 fathoms. In rounding the point at the distance of ¼ mile, 6 and 5 fathoms water will be carried into Colonia roads.

If bound to Buenos Aires, steer to pass 300 yards south of San Gabriel island, and with its center bearing N. 3° W. (N. 11° W. mag.) course may be shaped to pass north or south of Farallon island.

South channel.—In leaving Montevideo for the south channel to Buenos Aires, steer so as to pass about 4 miles to the SE. of Indio Point lightvessel, or even more to the southward; but as the currents which always prevail in this part of the river are variable in direction, and sometimes attain a strength of 2½ miles an hour, the course should be carefully preserved by the bearing of El Cerro as long as it is in sight, which in fine weather will be at a distance of 28 or 30 miles, by which time the direction of the current should be fairly ascertained. Although this part of the bed of the river is nearly flat, great attention must be paid to the lead and the actual course, also a good lookout must be kept to avoid wrecks.

At about 12 miles from Montevideo the depths will be about 4 fathoms, mud, decreasing to 3½ fathoms as Ortiz bank is approached, over the tail of which 17 feet, soft mud, will be obtained at low river, deepening to 20 feet on its western side; but if the Indio lightvessel be not seen, do not haul to the northwestward until the water shoals to less than 3 fathoms, near Indio point. The state of the river should always be considered.

Should the soundings decrease to 16 or 17 feet before the necessary distance from Montevideo is made good a vessel will be near the southern shoal patch of Ortiz bank; but should they increase to 4½ fathoms or more she will be some distance to the southeastward, bearing in mind that, generally, the bottom is more or less soft in the channels and more or less hard near the banks. The grove of trees on Indio point is visible 13 miles in clear weather from the deck of a vessel. This, when first sighted, will give an approximate distance from it, and may assist the mariner if the lightvessel is not seen. But he must not be deceived in his distance from the land, as it may be seen by mirage at a greater distance. In thick weather it will be prudent to anchor.

The Indio Point lightvessel, if in position, may be passed a prudent distance on either side, then steer N. 37° W. (N. 45° W. mag.) about 28 miles, making due allowance for the current, the direction of which will probably be seen in passing the lightvessel. The ebb sets strong to the SE. and the flood to the northwestward. When the Chico lightvessel is seen, which it probably will be after having run 18 or 20 miles, steer to pass northward of her, then a N. 77° W. (N. 85° W. mag.) course will lead to the Bar anchorage and guard ship lightvessel at Buenos Aires. Should the Chico lightvessel not be seen, in consequence of thick weather, or being out of her proper position, skirt the edge of Ortiz bank by the lead.

Between Ortiz and Chico banks is the deepest part of the channel, the depths increasing near the latter bank. Towards Ortiz bank the depths shoal very gradually. Chico bank is steep-to. It is scarcely known of a vessel grounding on this edge of the Ortiz bank; but several have grounded on that of the Chico. From the lightvessel the soundings westward are regular as far as Santiago bank, when they gradually decrease to Buenos Aires.

From Indio Point lightvessel to Buenos Aires the navigation for a sailing vessel presents some difficulties, unless with a fair wind, and at all times require great attention. Between these two points, in ascending or descending the river, the seamen should not attempt to work against the current, unless the vessel can attain a speed of 6 knots, if the current is beyond its normal state of one or 1½ miles an hour. It will be more prudent to remain at anchor. In working to windward do not stand nearer than 3 fathoms on either side.

When in the vicinity of Chico bank, Ortiz bank should be kept aboard, as the former is steep-to and must be approached with the greatest caution. When Magdalena church (if seen) or the trees bear S. 31° W. (S. 23° W. mag.) a vessel will be between Ortiz and Chico banks; and with the church S. 15° E. (S. 23° E. mag.) will be westward of Chico bank, and may stand farther to the southward.*

A vessel will then have no difficulty in tacking on either side of the channel at a prudent distance from the edge of the banks, bearing in mind that Santiago bank is steep-to. If bound to Colonia or the Hornos islands steer by the lead along the edge of Ortiz bank, or, with Farallon light in sight, it may be steered for bearing N. 8° E. (north mag.). A pilot boat will probably be found about 6 miles southward of Farallon lighthouse. (*See* Directions for Colonia.)

Vessels leaving Buenos Aires for the southeastward should steer about S. 77° E. (S. 85° E. mag.) from the guard ship lightvessel, careful bearings of which whilst in sight will give some indication of the set of the current. Bearings of the poplars on Santiago point and Magdalena church and trees will assist in checking the position when approaching Chico bank. Should Chico lightvessel not be seen, on account of fog or other cause, the edge of Ortiz bank should be skirted by the lead; and when sure of being eastward of Chico bank steer for Indio Point lightvessel, making due allowance for set and keeping the lead going.

Currents and tides.—The general movements of the waters in the La Plata are greatly influenced by the direction and force of the wind. With fine weather and light breezes there is some degree of regularity in the tides, but in stormy weather the movements of the waters are entirely dependent on the force and direction of the wind. The strength of the alternate streams produced by the tides does not exceed one to 1½ miles an hour; but the current caused by the wind attains a velocity of 3 or 4 miles an hour.

---

*Magdalena church is only seen on certain bearings, the trees having grown up around it.

The variations of the winds have such an influence on the movements of the waters that there is nearly always a possibility of foreseeing the alterations in the weather from a daily observation of the current and height of the water. Before the winds from seaward are felt on the coast the current sets into the river and the water rises to a height in proportion to the strength and duration of the wind. At times the difference between high and low river is as much as 12 feet. For several hours, and sometimes for a whole day before a pampero, the water is seen rising in the port of Montevideo, which rising continues until three or four hours after the pampero has commenced. It is then quickly followed by a strong ebb.

The winds between NNE. and WNW. cause the river to fall the lowest. The down current is then stronger along the south coast, but it seldom exceeds 3 miles an hour. On the north bank it is inconsiderable.

When the wind has been from the NE. for some time (and occasionally before the NE. wind arrives) the waters flow to the westward along the north coast, whilst they are falling and running to the eastward along the south coast; and during the time the wind remains between SE. and NE. the current flows generally to the westward beyond Montevideo, without much increasing the depth to that point, while it fills up the river above the banks.

In fine weather a portion of the waters from the Parana and Uruguay run to the eastward along the northern shore, east of Colonia.

When gales from the north, or winds from the NW. to east prevail, the river falls considerably, and the current runs to the SE. and south; and when pamperos prevail, the river rises and the current flows to the NW., west, or SW., according to the direction of the channels. During the months of March, April, and May the rio de la Plata is higher than in the other months of the year, on account of the rising of its tributary rivers, which bring down trees, brambles, and weeds, formed into masses like islets, sometimes large enough to support 4 or 5 men standing, and known by the natives under the name of camalotes. During fine weather, without wind or other apparent cause, the river may fall or rise considerably.

If the water rises for a longer time than the duration of a tide, in a calm or light breeze from NW. to SW., it may be inferred that the wind will blow from NE. to SE., and that it already blows from that quarter at sea.

At the mouth of La Pata in the vicinity of English and Rouen banks, in the months of August and September, the currents were found to set in all directions, but generally more toward east and west than to the north and south. The greatest rate observed did not exceed 1½ knots an hour.

Northward of English bank the currents are stronger, but variable in direction; easterly prevail, with a strength of 2½ knots.

A current has, however, been found running to the eastward at the rate of 5 miles an hour, at 5 miles WSW. of Lobos isle; and a vessel has been set in one night from Lobos isle to the northward of cape Castillos; also a vessel in sight of Piedras point found the current setting SE. 4 miles an hour. When there has been an unusual flood in the inland countries, and the sea is at low ebb, or when the spring tide is unusually high, and the river is the reverse, the current may set round cape San Antonio at least as strongly as it has been known to run past Lobos islet. These, however, are extreme cases, of rare occurrence.

It is likely these strong currents do not extend beyond the limits of the soundings, where they must lose their strength.

Off the entrance of the La Plata the current generally sets to the NNW. before and with southerly winds, and to the SSE. before and with northerly winds, at rates varying from one to 3 miles an hour. An east and ENE. current of one mile an hour, a supposed outfall from the La Plata, has been experienced, extending to longitude 40° W.

Between Santa Catharina island and the La Plata the current generally sets to the southward with NE. winds; a rate of 40 miles has been experienced in 24 hours. SE. winds force the currents to the shore, with a heavy sea. The prevailing winds differ according to seasons.

Ground log.—From what has been said of the irregularity of the currents in the La Plata, and the importance of knowing a vessel's position, it will be easily seen how useful the ground log may be made, which alone in the absence of land, etc., can indicate the strength and direction of the current; but notwithstanding its simplicity we fear it is seldom in use. We can not call too strongly the attention of the mariner to this subject when the depth of water will admit of its use. The very smallest line that will haul in a lead of 5 or 6 pounds weight is the best. The lead should be rounded, long, and tapered at each end, in order that it should sink fast and be hauled in easily.

The lead may also be made fast to the log chip, without the peg being fixed in it, and thrown overboard; the lead taking it to the bottom will prevent it coming easily home to the ship. In this manner it is clear that the log line will show the distance run by the ship, both from the effect of the wind and current. Having noted the number of knots, make the line fast, so that it may be upon a strain. Set the bearing of it by compass and the opposite point will be the vessel's course made good. There can be no doubt of the course and distance obtained in this manner being as correct as if there were no current. If the log be hove in the usual way, and the distance shown by it, and the vessel's course by compass be compared with the course and distance shown by the first mode, sufficient data will be obtained to find the force and velocity of the currents.

Winds.—One of the distinctive features of the climate of the La

Plata is the frequency and rapidity in the changes of the weather; but these changes depend on certain laws which facilitate the means of foreseeing them. The general law regulating these changes here, as well as in the other parts of the Southern Hemisphere, is that the ordinary change in the wind takes place from right to left, or contrary to the movement of the hands of a watch. Therefore the wind generally backs from north to NW., to SW., to SE., etc., etc., whilst in the Northern Hemisphere it veers from left to right.

During the summer months, from September to March, the winds prevail from the eastward. The atmosphere is then pretty clear, but thick near the horizon, and the land is difficult to be seen. In the offing, the winds blow from the NE., hauling gradually to the east in approaching the river. Within the river during this season the winds generally back round the compass in twenty-four hours. A fine, steady breeze blows from the SE. during the afternoon; in the evening it is from NE., and during the night from north. At Montevideo this afternoon breeze is called "*brizas*." Often fresh gales prevail during the night.

On the following morning it backs to NW. and west, or else calms prevail until the wind springs up from the southward or sets in from seaward about 11 a. m. This wind is call "*virazon*." When it fails, or the wind from the north or NW. continues to blow, squalls more or less heavy may be expected from the SW. A few days of tolerably fine weather are often followed by clouds, rain, and strong breezes, but it is difficult to foretell from which quarter they may come.

Should it be from the northward, a continuance of bad weather may be depended upon, as, unless the wind is from the southward, there is no duration in the fine weather, although it may appear likely to last. The more clouds, rain, and wind from the northward the more it will blow hard from the southward.

During the hot summer months, when it does not rain sufficiently to cool the atmosphere, the winds from the northward are nearly suffocating, and produce a dry, oppressive, debilitating atmosphere, which affects both man and beast in a way that would scarcely be credited by those who have not felt them. These winds last about three days, and are always accompanied by a depression of the barometer, which falls in proportion to its strength; whilst blowing the atmosphere is charged with electricity; a storm invariably follows, during which the wind backs to the SW.

When it blows from the southward the weather is cool and agreeable; there is, however, a marked difference between SE. and SW. winds; the former, although cool, are damp, as are all winds from the eastward; but the SW. winds bring the most clear, elastic, refreshing atmosphere that can be imagined, and the climate of the rio de la Plata whilst the wind is from this quarter can hardly be surpassed. A little time before the new and full moon there are often strong breezes from the SE., with rain; but sometimes it blows from the northward; not so hard as from the SE., and the temperature is higher. The "*pamperos*" or SW. winds seldom prevail at this season.

During the winter months, from March to September, the most prevailing winds at the entrance of the La Plata are from west to SW., and in the river they are oftener from north than south or west. At that season, when the weather is really fine, the winds back round the compass as in the summer, but in ordinary weather it happens only once a fortnight, taking place, as already mentioned, from south to east, north, and west. The winds from north blow with rain, lightning, and thunder; it hails at the first with south winds. With the wind from the east there is an abundance of rain. When the wind backs as above fine steady weather may be expected; but if in a contrary way it is nearly a certain sign of bad weather.

During the months of June to October the squalls from SW., or pamperos, prevail the most; at that time the winds are variable, with squalls, calms, and rain. When the wind is from the east with squalls it is generally followed by those from the west with squalls, and vice versa, and the weather sets in fine again only when the wind backs either to the north or south, according to its rotation. Thus the wind begins at west, backs to the south and SE., blows rather strong at east and NE., changes to the NW. in a squall, and the weather becomes fine again only if the wind settles in the north.

During both summer and winter the winds from NW. bring hot, rainy, disagreeable weather; those from the south, when the first squalls are over, bring rain and cold weather; and those from the west dry, hot, pleasant weather.

In the winter the winds from south have the character of lasting squalls, whilst in summer they are of a shorter duration, but more sudden and violent.

Pamperos.—The bad weather in the La Plata sets in with the wind from SW. or SE. The winds from the SW., whether strong or light, are called "*pamperos*," from their blowing over the pampas before reaching the coast. They may be divided into two classes, the general and the local pampero. The local pampero is of short duration, and should it blow hard the weather is clear. The general pampero, on the contrary, is accompanied with rain and storms. It descends from the Cordilleras, passes over the pampas, generally lasts for three days, and is known in the La Plata by the name of "*pampero sucio*," or dirty pampero.

They set in generally with a strong squall from the westward, which darkens the horizon, and is followed by other heavy squalls of wind, rain, hail, and thunder; soon after the sky becomes clear, the wind remains, becomes cool, and backs to the SW. and SSW. By attention to the barometer and the state of the atmosphere the coming of a pampero can generally be foretold, but sometimes the signs of bad weather end in a short squall with thunder and lightning, which soon passes away. A vessel from the northward on reaching the parallel of 31° or 32° S. will be in the vicinity of the pamperos; they are felt as far as 48° W. and between the parallels of 31° and 40° S. These squalls are dangerous, as they are sudden, but their violence has been exaggerated, and they are no more to be dreaded than the heavy squalls which are met with in other parts of the world.

The different circumstances which generally precede a pampero are: Interruption of the regular daily and nightly breezes; a series of north winds, with great heat and suffocating atmosphere; fresh breezes from NW., followed by unsettled weather, then by a north wind, freshening and backing to NW., with haze or a little rain (if in this case it should be hazy, with lightning in the SW., a pampero is certain); a great depression of the barometer for several hours and sometimes entire days; the rising of the water of the river; the presence of myriads of insects in the air, and a kind of white filament resembling spider's web; and, lastly, the extreme clearness of the atmosphere, which admits the cerros of San Juan to be seen from Buenos Aires and other objects at a great distance.

As soon as the pampero blows the temperature becomes cold; its duration in winter is generally from two to three days; it may last five or six, but very seldom. In summer it is less frequent than in winter, does not last so long, but blows with more violence. It is known then by the name of "*turbonada*," as after a few hours it veers to the south and SE., losing all its force. In the winter it often backs to south and SE., when it blows in squalls for several days, it being then foggy, with rain and consequently the coast is not easily seen. When it comes on with a clear sky it lasts longer than in cloudy weather. Should it continue raining whilst the wind backs to south and SE., it is a sign the pampero will last and that fine weather will be preceded by squalls from the SW.

If on the rising or setting of the sun the wind should lull occasionally it is a sign of an early change or less wind, and if it freshens again it will only be for a short time. When the pampero is about to abate the atmosphere becomes clear, and the wind veers to west. The weather is generally bad at the end of August, and there is the same regularity in the change of weather as there is about the time of equinoctial gales in the English channel.

There is a prevalent idea amongst the inhabitants that a heavy gale annually occurs on Santa Rosa's day, the 30th August, and it seems pretty certain that within a few days of this date dirty weather often does come on.

Southeast winds.—These winds blow with much force, cause a heavy sea, and a strong current to the NNW.; they are known in the country by the name of suestadas, and are more dangerous, as they prevail on a coast without shelter, accompanied with fog and rain, which prevents the land from being seen. They are anticipated by a great rise in the barometer, cloudy threatening weather, with lightning, and a red sky on the rising of the sun; the water in the La Plata and on the coast becomes high, and a strong current flows into the river.

Barometer.—The rise and fall of the barometer will generally indicate the changes of the weather, though it may frequently happen that the oscillations may be the same with opposite winds; it must therefore be consulted with great regularity. The general rule is that it rises with easterly winds and falls with westerly winds; but with bad squally weather it invariably falls from whatever point the wind may be blowing. The greatest mean height of the barometer takes place in August and September; the lowest in the months of January, February, and June. The highest range may be about 30·6 inches and the lowest 29·3 inches.

In fine weather the mercury falls a little for east and SE. winds, and rises again when they are settled, falling again for westerly winds. If with westerly winds the barometer continues to fall it may be inferred that it will blow again from the east. With the wind from SE. to NE. immediately after a storm, or as soon as the weather is clearing up, it is not long without rising and remaining sometimes very high as long as strong winds from SE. prevail; if, on the contrary, the barometer continues falling, and especially if it should become cloudy in the SW., a pampero may be expected. The fall which precedes bad weather is generally a great deal slower than the rising which takes place when the weather is clearing up.

Thermometer.—The mean temperature in the La Plata is about 65°, but the changes of the temperature are as sudden as the changes of the wind. The extreme thermometrical limits are from 32° to 88°. The highest temperature is in the first fortnight of February; the lowest in the first fortnight of July. The thermometer rises with north winds and falls with south winds. It seldom snows, but in fine winter nights the ground becomes covered with hoar frost and the stagnant water with a slight coating of ice.

Rain.—The rain is very irregular in the La Plata; it falls more frequently during the spring and autumn than in the other two seasons. May and October are the two months when it rains the most; it is more frequent during the night than by day.

As the difference of temperature between night and day is always considerable, the vapor dissolved in the atmosphere begins to condense as soon as the sun has set, when the dew falls by its own weight; and it often happens in clear weather that it looks like thin rain.

Fog or haze.—During the winter months of July, August, and September there are thick fogs, especially from the entrance of the river to Ortiz bank; they are not so intense farther up. At Buenos Aires they seldom last more than a few hours.

Lightning is extremely frequent during the summer, and indeed all the year round it is more frequent in the La Plata than in most other parts of the world. Vessels' mast, churches, and houses are often injured. These accidents, however, do not take place so often as from the frequency and vividness of the lightning might be imagined.

Mirage, or refraction.—In the rio de la Plata there is considerable refraction, and more so in the tributary rivers. It often happens that objects above the visible horizon disappear; others below the horizon appear and are clearly seen at a great distance. At Buenos Aires the cerros de San Juan, below the horizon, on the Oriental coast, a distance of 36 miles, are sometimes seen. When this is the case the atmosphere is extremely clear, and it is a most certain sign of bad weather.

Uruguay and Parana approach.—The approach to these rivers lies between the coast northward of Colonia and Hornos islands and Palmas flats, and is named the Martin Garcia channels.

Coast.—The eastern shore from Manuel point, opposite the Hornos islands, trends in a northwesterly direction for about 23 miles to Martin Chico point; the coast is slightly elevated, rising into hills from 100 to 120 feet high. The chief features are the ombu tree of San Pedro, and the river of the same name north of it; also the ombu tree and river of San Juan, and 6 miles inland the cerros de San Juan.

Cerros de San Juan are three peaks of the same hill, which forms the culminating point of this coast; they lie 17 miles N. by W. of Colonia, and at 6 miles from the coast. The northern peak is 445 feet high, the middle 350 feet, and the southern 370 feet. They serve as a useful landmark to navigation over this part of the river, and in clear weather may be seen from the tops of the houses in Buenos Aires, a distance of 33 miles. When so seen it is generally considered a sign of bad or wet weather.

Martin Garcia island stands boldly up in the channel 25 miles NW. of Colonia; it is a mass of granite, almost circular, with the form of a flattened cone, 82 feet high; it is about 2 miles in circuit, with its shores rocky except on the NW. part, where there is a small beach and a landing place. Its position between two narrow channels which lead to the great rivers Parana and Uruguay renders it a strategic post of some importance, as in going up or down a vessel must pass within ½ mile of the islet on the south side, and within less than one mile by the canal del Infierno. There is a battery and a granite pier at the SW. point, and a small garrison; also some workers in the quarries, as the stone is good for building and paving.

A good lazaretto has been built on Martin Garcia, capable of accommodating a large number of people.

Telegraph.—Martin Garcia is connected with the adjacent mainland and Buenos Aires by a submarine cable; two iron conical buoys, with flag, and marked telegraph, show the direction of the cable. One is placed about 100 yards distant from the landing place of the cable on the island and the other near the landing place on the main; definite positions not known. Anchorage is prohibited in the direction of the cable.

Light.—From a lighthouse erected on the summit of Martin Garcia island is exhibited, at an elevation of 141 feet above the level of the river, a *fixed* white light, which should be visible in clear weather from a distance of 14 miles.

Beacons.—Two beacons are placed on Martin Garcia for the purpose of guiding vessels through the channel; one named Farol mast, near the center of the island; the other a white beacon near its SE. end. These, when in line, lead between Santo Anna and Middle banks.

Channels.—There are two passes or channels to ascend the river above Martin Garcia, one to the SW., the other to the NE. of the isle. The former is named Martin Garcia channel, the latter the canal del Infierno, from the difficulty formerly of navigating it. These channels are marked by buoys, but their positions must not be depended on. Vessels of about 14½ feet, and occasionally vessels of 16 feet, use the canal del Infierno.

A new channel, carrying 15 feet at low water, has now (1893) been dredged to the NW. of Pareda point. It is marked by red buoys on the starboard side in entering from the sea, and by black buoys on the port side.

Martin Garcia channel, about 17 miles long and ½ mile wide, is formed on the west side by the extensive bank named Palmas flat, which blocks up two-thirds of the area of the river, and on the east by the St. Anna and other detached banks, which extend to the southeastward from Martin Garcia, and between which it would be difficult to navigate without a beacon always in sight, not only to point out the route, but also to show the variable set of the current.

The pilots state that this channel is little used, and is not navigable for vessels drawing more than 8 feet.

Buoys and beacons.—The buoys and beacons in Martin Garcia channel are altered to meet the constant change in its direction, and are not to be depended on in their charted positions.

Wrecks.—Two wrecks lie in the Main channel, near the western edge of Santa Anna bank, respectively S. 33° W. (S. 25° W. mag.) distant 3$\frac{8}{10}$ miles, and S. 22° W. (S. 14° W. mag.) distant 4 miles from Pareda point.

Directions.—A pilot is necessary, owing to frequent changes in the channel.

Canal del Infierno, which passes to the NE. of Martin Garcia, is reported to have better water than the channel south of the island, and is used by vessels drawing as much as 16 feet, but the current is stronger, and may be 3 miles an hour.

It is needless to say that neither of these channels should be attempted in foggy weather or by night. Here, as elsewhere in the La Plata, the height of the water depends on the force and direction of the wind; it rises 5 or 6 feet with SE. and south winds, and falls with those from the opposite quarter. A vessel at anchor lies with her head up the river.

Wreck.—A wreck lies in the fairway S. 74° E. (S. 82° E. mag.) distant 2$\frac{8}{10}$ miles from Martin Garcia lighthouse.

The Uruguay river separates Brazil and Uruguay from La Plata, and flows into the rio de la Plata, where its waters preserve their clearness for miles before they are lost in the muddy current from the Parana. Its whole length is nearly 900 miles, and it is navigable for vessels of about 12-feet draft as far as Concordia and Salto (about 240 miles above Buenos Aires), and for very light draft steamers or boats, with a high river, beyond it. The navigation is easier than that of the Parana; the currents are not so strong, and there are fewer banks. The most difficult parts are usually marked by buoys or stakes, but they are often washed away. The entrance of the Uruguay is formed on the west by the mangroves of the delta of the Parana, and on the east by some high ground terminated by two principal headlands, punta Gorda, a wooded bluff 85 feet high, to the south, and punta de Chaparro on the north, 5 miles apart. The river here is narrowed to about a mile in breadth, and varies from 12 to 15 fathoms in depth.

Southward of these points are two villages, one, Las Vacas, near the outlet of a river of the same name, and opposite the mouth of the Parana Guazu; the other, Las Higueritas or Nueva Palmira, in the strait of the Uruguay, where is a pier and some coasting trade.

The great mouth of the Parana, known commonly by the name Guazu, opens out into the rio de la Plata at 12 miles NW. of Martin Garcia, and 6 miles southward of the entrance to the Uruguay, flowing from the westward; all this western coast is formed by low, marshy land covered with woods and impenetrable mangroves, and intersected by numerous channels, which are so many branches by which this great river flows into that of the La Plata.

The aspect of the Uruguay is altogether different from that of the Parana. In the lower part of its course, between punta de Chaparro and Fray Bentos, a distance of about 50 miles, the river is 5 miles wide and has the appearance of a lake. It is incumbered with flats, but there is a navigable channel running through, which enables nearly all vessels that can pass Martin Garcia to reach Paysandu, about 110 miles above punta de Chaparro, the entrance to the river. Above Fray Bentos the river narrows rapidly to a ½ mile and less.

The right bank, Entre Rios, is generally low, wooded, and as monotonous as the low shores of the Parana, the land here and there ranging, perhaps, to 180 feet at the highest. This bank being low and swampy, the principal towns of Entre Rios are from 6 to 9 miles in the interior, whence the commerce of the province is carried to the Uruguay by the facilities of its affluents, the route to Buenos Aires being much shorter than that by the Parana. The left bank, that of Banda Oriental, is composed of pleasant hills reaching occasionally from 200 to 500 feet high, broken by numbers of rivulets, with receiving houses at certain points connected with the estancias and villages, from which the produce of the country is exported.

Height of river.—The river is subject to periodical rises, occasioned by the great rain in springs in the Brazilian provinces, where it takes its source. It rises in September and attains its maximum height in November, after which it falls very rapidly. In places where the river is narrow it attains the height of about 30 feet, and above Salto 15 feet. A strong southerly wind will, when the river is low, cause the water to rise a few feet, up to within 20 miles of Salto. The strength of the current depends upon the height of the river, and during a high river runs from 2½ to 4 miles an hour; at other times from ½ to 1½ miles an hour, and is then much influenced by the winds. The prevailing winds are from the northward, generally following the course of the river, as in the Parana.

Mercedes.—About 50 miles above Martin Garcia, on the left bank of the river, the rio Negro joins it. The town of Mercedes, 30 miles up the rio Negro, is stated to be clean and healthy.

Fray Bentos.—A place much frequented by foreign vessels is Fray Bentos, which serves as a port for Gualeguaychu. In this part of the river, which is 6 miles in breadth, the channel is very near the eastern bank. The little river Gualeguaychu, leading to the town of the same name on its right bank, is directly opposite Fray Bentos. This river is about 10 miles in length, with a bar at its entrance; vessels of light draft ascend when the water is a little above the average height, which is always the case when the wind is from the southward. The difficulty of reaching Gualeguaychu renders the operation of loading and unloading very tedious. The produce is hides, tallow, bones, and jerked beef. Here all vessels may lie that can pass Martin Garcia flats.

Concepcion del Uruguay.—The next port is Concepcion del Uruguay, situated 12 miles below Paysandu, and about 45 miles above Fray Bentos. Vessels can approach to 200 yards from the quays. The little river of Concepcion admits vessels of light draft. Here is embarked the produce of the estancias in the district.

Paysandu, about 57 miles above Fray Bentos, ranks next to Montevideo in Banda Orientale. It has a customhouse and piers, and is in telegraph communication with other important towns. During the greater part of the year it is accessible to vessels of 14 feet draft, although at times there is not more than 6 or 7 feet water on the bar, and vessels have been detained for about three months outside.

The United States is represented by a consular agent and vice-consular agent.

Concordia and Salto are situated about 75 miles above Concepcion; Salto Grande is 17 miles higher up the river. Beyond Salto the river is only navigable for very small craft, as the channel is nearly closed with rocks.

Between Salto and Herrideros rocks, 15 miles below, the bottom is rocky, and is dangerous to ground on.

A regular weekly communication is established between Buenos Aires and the principal towns of Uruguay, as far as Salto.

Pilots for the Uruguay are usually engaged at Montevideo or at Buenos Aires, but sometimes they may be obtained at Concepcion, a place where a large number of foreign vessels trade to. No vessels should attempt to navigate this river without a pilot.

Supplies can be obtained at all the towns near the banks of the river. Coal is scarce, but wood, which answers well for steaming purposes, may be obtained.

The Parana river rises in Brazil, NW. of Rio de Janeiro. The upper streams of this river have various names, but at the confluence of the rio Grande, the longest of them, with the Paranahiba, it takes the name of Parana, which it retains till it merges itself into the rio de la Plata. The Parana flows southward, receiving several large affluents, and separates Paraguay from Brazil and La Plata. It then turns to the west, still forming the boundary between Paraguay and La Plata. It receives the Paraguay from the north, and at 13 miles to the SW., at Corrientes, it again turns south and flows through La Plata into the river of that name.

The total length of the Parana is about 2,100 miles, namely, 500 from the source of the rio Grande to its confluence with the Paranahiba, 1,000 from thence to the union of the Paraguay and Parana, and about 600 from that point to the rio de la Plata. In all the upper part of its course, as far as the province of the Missions (Missiones), the river flows through a mountainous country, between scarped and tortuous shores, which renders it unnavigable, and its breadth does not exceed from 450 to 550 yards. But below the Salto d'Apipe, the highest point a vessel can reach, and during its course in the Argentine, the aspect and nature is quite opposite.

About 450 miles above Corrientes is an immense waterfall, named Guaira fall.

Below Corrientes the river acquires an average breadth of from one to 3 miles. Sometimes, in the great rise of its waters, the breadth extends many miles. Great changes then take place in the configuration of the river, new islets are formed, and others carried away by the current, and there is often great difficulty in finding the route. In the upper part the bed of the river is composed of rocks, but below Corrientes it is of shifting sand, and sometimes with a little clay.

Height of river.—The Parana and its affluents are subject to a periodical rise, which then permits vessels of 12 or 13 feet draft to reach Corrientes, and those of 7 feet draft the Brazilian province of Matto Grosso, in lat. 18° S., at about 2,000 miles from the sea. The rise or swelling of the river is produced by a double cause—the melting of the snow on the Cordilleras, whose waters descending to the Parana by its affluents from the westward, and by the great rains which fall at nearly the same time in the Brazilian provinces, reaching the Parana by its affluents from the eastward.

When the water is low the river is navigable to Corrientes for vessels of about 7 feet draft, and for vessels of smaller draft to the Salto d'Apipe, 135 miles farther on, in lat. 27° 30′, where the last rapids occur. It has a low and a high season, depending on the periodical rains. The low season is said to last during the winter and spring of the Southern Hemisphere, from June to December, and the high season during the summer and autumn; but the difference in the height of the river in these seasons varies at different times and in different parts.

In the lower part of the river the water rises occasionally when the wind blows strong from the SE., which forces it back; but this rise lasts only while the wind is from that quarter, as it falls again when it veers to northward or westward. During a very low river the sandbanks forming the port of Parana have uncovered 5 feet, and in a very high river the water has been known to rise to the level of the quays at Corrientes.

The Parana is lowest in the month of December. It rises in January, February, and March, attaining its greatest height in the latter month. In April, May and, June it is apparently steady. In July, August, and September it falls and rises irregularly. In October the great fall commences, from one to 4 inches per day, continuing to the latter part of December, when it begins to rise again at about the same rate. The difference between high river and a low one is about 12 feet; but it is irregular and varies considerably, depending much on the quantity of rain that falls in the Brazilian provinces and the melting of the snow on the Andes.

Current.—In the navigable part of the Parana, from its mouth to the province of the Missions, the average strength of the current is from 2 to 2½ miles an hour. It is most rapid in the narrows and where it runs along by the high cliffs, and, on the contrary, weakest when it flows between low, inundated banks.

San Nicolas.—The town of San Nicolas, with a population of about 12,000, stands on the right bank of the river, about 110 miles from the entrance of the Parana Gauzu, and exports about 250,000 frozen sheep to England annually. It may be approached by either channel. The upper is almost blocked. All vessels enter by the lower channel, unless of very light draft. There is a pier alongside which vessels load and discharge, and good anchorage in 9 fathoms close to the shore. H. M. S. *Flamingo*, 1888, found good anchorage in 6 fathoms water, abreast the cathedral, on the starboard hand entering. It is necessary to anchor on this side to leave a clear channel for small craft and river steamers; also to avoid the strength of the current. Vessels of 17 feet draft can lie alongside the bank and at the pier at the frozen-meat establishment. Vessels intending to proceed higher up the river anchor outside the islets. Supplies are cheap and plentiful.

Rosario.—The principal port for foreign commerce on the Parana is Rosario, a thriving town about 40 miles above San Nicolas, with a population of about 55,000 inhabitants. Vessels of 17 feet draft can navigate to Rosario when the river is high, and in general all those that can pass Martin Garcia. Sailing vessels do not usually go beyond Rosario on account of the difficulties of navigation. There are piers with a depth of 17 feet alongside for discharging cargo, but the harbor, from the want of dredging machines, is reported to have been much reduced in depth in the last 10 years.

The United States is represented by a consul and vice-consul.

Coal may be obtained from a hulk moored in the river. About 2,000 tons of coal is usually kept in stock at Rosario. Coal can be put on board by lighters at the rate of about 120 tons per day. On emergency, coal can be obtained from the Central Argentine Railway company at cost price. Vessels proceeding up the river should coal at Rosario, as it is cheaper and more plentiful than at Parana, Le Paz, or Ascuncion. The railway company has a factory where repairs to engines may be speedily effected. Supplies are plentiful at moderate prices.

Communication.—There is telegraphic and railway communication with Buenos Aires and other places.

Anchorage.—The anchorage at Rosario is in 8 fathoms water, at a distance of about 200 yards from the shore; vessels may haul alongside the wharf. The port is stated to be gradually filling up, as in the last 12 years an island or sandbank has sprung up a little above the town, and banks are reported as having formed where formerly there was plenty of water. The current runs from 2 to 3 knots an hour.

Santa Fé, the capital of the province of that name, stands on the NE. bank of the Salado at its junction with the Parana, about 90 miles north of Rosario, and has a population of about 10,000. Steamers from Rosario call twice a week, and a steam ferry crosses the river to the city of Parana. Santa Fé is connected with the port of Colastine, a distance of 25 miles by rail.

Parana.—The town of Parana, situated about 90 miles above Rosario, is the capital of the province of Parana, and has a population of about 20,000. Vessels of 10 feet draft can reach Parana throughout the year.

The temperature at Parana is lowest in June and July, when it rises after sharp frosts in the morning from 30° to 56°. The hottest months are December and January, when the thermometer ranges from 95° to 54°.

Large quantities of game may be shot on the shores of the Parana.

Coal.—At Parana coal is kept for the river steamers, but the supply is uncertain and expensive. Hard wood, a good substitute for coal, can be obtained at any place above Parana.

Hernandaria point.—At about 45 miles above the town of Parana, on Hernandaria point, is a Swiss colony of about 350 inhabitants, with a mission establishment and an Argentine meteorological observatory.

La Paz, situated about 80 miles above the town of Parana, has about 2,000 inhabitants. The anchorage is in about 10 fathoms water.

Coal may be obtained at La Paz at about $15 per ton. About 200 tons of coal are kept on board the hulk.

Alexandra.—An English colony named the Alexandra is established about 70 miles above La Paz, distant about 15 miles from the banks of the river.

Corrientes.—Anchorage.—The anchorage off the town of Corrientes, in from 8 to 12 fathoms, is not good; the current is strong and irregular, averaging 3½ miles or 4 miles an hour, so that it is necessary either to moor or to lay out a hawser to the shore.

Directions.—It would be difficult to give any specific directions for the navigation of the Parana, where in places the channels vary much every year. There are many islands formed where deep water was found years ago, and there are now deep and good passages where none formerly existed. The charts should therefore be considered merely as sketches of the river. It requires constant practice, care, and great attention in navigating this river. Hands should be kept by the anchor, and attention paid to the lead. It is navigable for a steamer of 12 feet draft for a considerable distance at all times of the year. A vessel should anchor at night in a broad part of the river where the current is not so strong and the banks more shelving than in the narrow parts. When going against the stream, should the vessel pass the land at a rapid rate, she will be out of the channel and in the eddy. Avoid rushes, ripples, and smooth patches; whenever the river takes a sudden turn, open the reach before entering, or keep on the concave side of the river.

Keep nearer the upper than the lower bank, for should a vessel get ashore on the upper bank she can easily haul off, but if on the lower bank a bower anchor must be laid out up the river and the cable hove taut, when, after a few days, the bank will wash away, and the vessel will float in most cases without being strained in the least. If a vessel take the ground in ascending the river, she is easily got off again, but if descending, if she once touches, she remains fast. It is very common to hang an anchor astern in descending the river, to let go the moment the vessel touches the ground.

The only part of the river a vessel can navigate at night without great inconvenience is between the Boca de Guazu and Rosario, the shoals being few in number and the route easy to follow, but the descent at night is always dangerous, and should not be attempted unless in cases of urgent necessity. Sailing vessels can not navigate at night.

Steamers of 12 or 13 feet draft can, with high water, reach the Paraguay, but those above that draft can not proceed above the passes of San Juan, about 10 miles above La Paz. The pilots usually examine these passes by boat before proceeding through with a vessel, on account of the constant changes.

Parana de la Palmas is the southern branch of the Parana river, joining the main stream at San Pedro. The channel which leads into the Parana de las Palmas, or Campana river, is named boca de Campana. The river is very crooked, but deep on both sides, the only dangerous spot being about 25 miles above Zarate, called Antonio point. Here the river turns at right angles, and on the starboard hand going down are sunken rocks. Here there are whirlpools, and the current sets on the rocks; in light winds sailing vessels must be dropped down, stern first. Steamers of considerable draft proceed to Campana and Barredro by this branch, entering from the main stream. The entrance to Parana de la Palmas is about 18 miles northwestward of Buenos Aires, across Palmas flats.

H. M. S. *Cracker* descended this branch in May, 1875, turning into the Capitan branch, and thence through the mouth of the Lujan river to the rio de la Plata. The vessel grounded several times on soft mud. In some places in the Tigre the channel was scarcely broader than the length of the ship, and extremely tortuous. The mouth of the Parana de la Palmas, although comparatively deep, is avoided on account of the difficulty in keeping the channel over Palmas flat, which is not buoyed; whereas the route by the Capitan can be taken without buoys.

PARAGUAY.

Paraguay is the only republic of South America that has no sea coast. It lies between the great river Parana and its large tributary the Paraguay. These rivers embrace the territory east, south, and west. On the north, its limit with Brazil is the Apa river, a tributary of the Paraguay, and the heights of Maracaju which extend from the head of the Apa to where the Parana forms its great waterfall of Guayra, near latitude 24° S. Paraguay has an area of 88,807 square miles, with a population of about 600,000. A range of heights at an elevation of about 2,000 feet and forming part of the great tableland of Brazil stretches southward through the midst of the country, separating the tributaries of the Parana from those of the Paraguay. The southwestern part of the country where the Parana and Paraguay rivers approach each other until they unite, is occupied by very extensive marshes.

Productions.—The forests of Paraguay are noted for their splendid timber trees; but the most important natural production is the tea, named Yuba maté, made from the dried leaves of a species of holly that grows along the central heights. Tobacco and mandioca are cultivated in small quantities all over the western part of the country.

Climate.—In Paraguay the hot season extends from October to March, and the cool for the rest of the year. The mean annual temperature is 75°, and the rainfall about 60 inches.

The Paraguay river issues from several lakes in the sierra Diamante, at the height of 1,020 feet above the sea, in about latitude 13° S., longitude 55° 40′ W., and flows southward in a straight line for 850 miles, but, taking into account its detours, it is little less than 1,400 to 1,500 miles; it traverses the great marsh of Xárays in all its length, and flows into the Parana a little above Corrientes, 650 miles above Buenos Aires, and separating La Plata from Brazil and Paraguay. Its whole length from its source to 14 miles NE. of Corrientes is about 1,890 miles. The breadth near Asuncion varies between 220 and 550 yards.

The two banks of the Paraguay are in general of the same aspect, having the same small cliffs of the average height of about 6 to 13 feet, which are broken by a number of rivulets from the marshes. Of the two, the left bank is higher; both slope downwards toward the interior, there being generally but a narrow strip of dry ground between the river and the lagoons and swamps. Most of the trees that grow on the edge of the river are of little use except as fuel, which is suitable for steaming purposes. Great numbers of carpinchos, different species of deer, game of many kinds, large numbers of caïmans, birds of the marsh, etc., are seen. Alligators and jaguars are numerous.

The Pilcomayo, a tributary of the Paraguay, has a course of about 1,600 miles from its source in Bolivia to its junction at Asuncion. This river was explored by Father Paliño in 1721, and again by Lieut. Von Nivel in 1844, but it is little known.

The Vermejo, the next affluent south of Pilcomayo, is 1,300 miles in length from its source in Bolivia to its junction with the Paraguay, near Humaita.

Height of river.—The Paraguay, like the Parana, has periodical rises, but the time is a little different. It commences to rise towards the end of February, and continues until June, when it falls. Its rise is very irregular, sometimes the high river taking place of the low one until within 90 miles of its mouth. When the Paraguay is very low, the Parana, on the contrary, is very high; the waters of the latter river then force back that of the Paraguay. The difference in level between low and high river is also variable; it is on an average about 9½ feet. The banks and shoals can be recognized by a well defined line caused by the water falling over the edge of the bank, which is generally steep-to.

During the average rise, vessels of 12 feet draft can reach Asuncion; those of about 9 feet draft can reach it the greater portion of the year; but during low water those only of about 6 feet can reach it. In favorable seasons vessels of about 7 feet draft are able to go as far as the San Lorenzo and Cuyaba rivers (about 1,500 and 1,600 miles, respectively, above Buenos Aires), and those of less that 5 feet draft can reach the town of Cuyaba, nearly 1,900 miles from the same place.

Pilots are necessary, but some of them are not as competent as they should be. As the channel changes so frequently, only those who run up and down in the river steamers can keep thoroughly posted.

Villa Pilar.—At about 50 miles from the mouth of the river is the town of Villa Pilar, or Nembucu, where pilots may be obtained. The houses are neatly thatched and whitewashed, each standing on a small inclosure shaded by orange trees. Off the flagstaff at the captain of the port's house is a rock with 6 feet of water on it, and 4½ fathoms close to; it will be avoided by keeping well over on the western shore close to the north point of the island, where there are depths of 3½ fathoms.

Asuncion.—From Pilar the channel is deep and winding, the scenery pretty, with occasionally large patches of cleared and cultivated land as far as Asuncion. The best anchorage at Asuncion is in 3 fathoms water, close to the shore, with the flagstaff at the captain of the port's house about SE., distant about 500 yards. Here a vessel will be clear of those going in and out, and the holding ground is good. Farther out the bottom is rocky, and an eddy causes vessels to swing round their anchors.

The town of Asuncion is situated on rising ground, and has a pleasing appearance. It contains several handsome buildings; the population is about 25,000; about 1,500 are foreigners. The country for 20 miles around is hilly and well cultivated with coffee, maize, tobacco, sugar cane, etc. Woods of all kinds, many very durable and well adapted for shipbuilding, are found in the forests. There is a railway to Villa Rica, distant 91 miles.

The United States is represented by a consul and vice-consul. The United States minister resides at Montevideo.

Communication.—A bimonthly Paraguayan steamer maintains rapid communication between Buenos Aires, Rosario, Parana, Corrientes, and Asuncion; there is also a Brazilian steamer monthly to Coimbra in Matto Grosso; and others frequently running between the above intermediate ports. These steamers, of small draft, navigate the river both by day and by night, and have excellent pilots.

Directions.—**Current.**—The strength of the current depends upon the height of the river; above Asuncion with the water at an ordinary height it does not usually exceed 1½ miles an hour; below the mouth of the Vermejo river the current runs from 2½ to 3 miles an hour. The navigation of the Paraguay is easier than that of the Parana, especially for steamers. There are but few shoals in the middle of the river, and as they are rocky and covered with sand, they do not shift as in the Parana. The depth is variable; it is greatest at Humaita, where there are from 22 to 27 fathoms water, and least at the passes of Laguna, Villeta, Lambaré, etc., and where at times the depths are only about 5 or 6 feet.

Remarks on the general navigation of the Parana apply also to the Paraguay, and most other rivers.

Large floating islands (camelottes) are brought down by the current, and often foul the cable, and may cause a vessel to drag her anchor, unless a careful lookout is kept.

Table of river distances.

Rivers.	Buenos Aires to—	Miles.
Uruguay ..	Rio Negro entrance	92
	Mercedes (rio Negro)	127
	Fray Bentos (opposite the rio Gualeguaychu)	114
	Concepcion del Uruguay	164
	Paysandu	176
	Concordia, and Salto	240
	Salto Grande	257
Parana	The mouth of the Parana Guazu	52
	San Pedro	135
	Obligado	144
	San Nicholas	170
	Rosario	210
	Santa Fé and Parana towns	300
	Hernandaria point (Swiss mission)	347
	La Paz	383
	San Juan channel	393
	Goya	510
	Bella Vista	560
	Chimbolan pass	588
	Corrientes	635
	Salto d'Apipe	780
	Salto de Guayro	1,070
Paraguay ..	The mouth of the Paraguay	650
	Humaita	670
	Villa Pilar	690
	Villa Franca	730
	Asuncion	827
	Villa de Concepcion	986

CHAPTER XI.

COAST OF ARGENTINE REPUBLIC—CAPE SAN ANTONIO TO RIO NEGRO.

Coast.—The coast, from cape San Antonio to Medano point, 40 miles to the southward, is of a light color, low and sandy. Occasionally straggling bushes or patches of rough grass are seen. Sandhills between 20 and 40 feet in height begin to show themselves 10 miles to the southward of Rasa point, gradually increasing in number and height as they approach Medano point, near which they rise to about 100 feet above the sea. Two of these sandhills, near one another, in latitude 36° 27′ S., resemble a Spanish saddle; they are rather higher than their neighbors.

Between 5 and 10 miles off shore ESE. of Rasa point it was found in the course of the survey that the quality of the bottom appeared different in two different years, although the depth remained the same. This change is attributed to soft oozy mud from the Tuyu bank being at times carried round Rasa point and deposited upon the sandy bottom, usually found to the SE. of that point, until a strong current or gale from seaward washes it again into San Boronbon bay.

Medano bank is an extensive and dangerous shoal stretching 6 miles seaward from Medano point. Generally the water upon it is much discolored and the lead will give warning; but at any time, even in fine weather, it would be prudent to give this shoal a wide berth. In crossing it irregular and shallow soundings were obtained, and at 3 or 4 miles from the shore there are patches of not more than 2 fathoms.

About Medano point the land is higher than that on either side. A range of hills between 100 and 200 feet in height stretches to the northwestward.

From Medano point to the narrow isthmus between the sea and Mar Chiquito lagoon the coast is lower than near Medano point; but it has a similar appearance, sandhills from 50 to 70 feet high, with a few patches of verdure. These sandhills and the coast near them have a whiter look than those to the northward of the point.

No danger is known to exist off this part of the coast; but as in some places, especially towards Medano point, the soundings are irregular, shoaling suddenly a fathom or two at a time and then deepening again, it is as well not to go nearer than 3 miles.

Light.—On Medano point stands a lighthouse (tripod shaped and painted white and red in horizontal bands), from which, at an elevation of 195 feet, is exhibited a *fixed* white light, visible 21 miles.

Mar Chiquito, 60 miles SSW. of Medano point, is a lagoon of salt water (visible from the masthead of a passing vessel), into which flow the Tandil and other small rivers. At times it overflows and runs into the sea, but generally there is a dry bank of shingle between. Southward of the spot where the Mar Chiquito overflows the land rises and is no longer sandy. A low range of cliffs, from 20 to 30 feet in height, is surmounted by a rising ground, of which the highest is about 80 feet above the sea. Pasture land now meets the eye. On that high ground, near which is the Estancia de la Loberia Chica (Small Seal farm), large numbers of fine cattle may be seen feeding.

Cape Corrientes, 18 miles southward of Mar Chiquito, is a rather bold headland about 120 feet high; it is the southeastern extremity of a range of hills trending east and west. The sierra Tandil and sierra Vulcan form part of this range. In clear weather three ranges of the latter are visible, having a wedgelike form. Near the sea these hills slope away gradually and are ended by a broken rocky shore.

Laguna de Los Padres.—Half a mile northward of the cape is a bay, with the town and church of Laguna de los Padres to the westward. Wool is shipped from this place, brought out through the surf in flat-bottom boats, and thence transshipped to cutters and taken to the vessels in the road.

Anchorage.—There is good holding ground in 6 fathoms clay, with the church bearing about S. 88° W. (S. 79° W. mag.) and cape Corrientes S. 14° E. (S. 23° E. mag.). The anchors should be lifted occasionally, as they are liable to get buried. The anchorage is an exposed one, with constant rolling and pitching, and vessels are recommended to proceed to sea with onshore winds, as many wrecks have taken place through vessels parting their cables. Landing in ship's boats is difficult. Provisions are dear, with the exception of meat. A vessel may anchor in this bay during offshore winds in 5 to 10 fathoms water, over clean sandy bottom; but with easterly winds of any strength a heavy swell would set in and render the anchorage unsafe.

Mogotes point, 5 miles southward of cape Corrientes, is 104 feet high, bare and sandy, terminating towards the sea in a low projecting spit, to which a vessel should give a berth of 2 miles. When near the point several sandhills may be distinguished, some of which are peaked and higher than others, whence the name Mogotes, signifying pointed cornstacks, which these sandhills rather resemble. Behind the sandhills the high downs, already described, extend to the westward.

Note.—Mogotes point is reported to be 5 miles farther north and 3 miles farther west than shown on the chart.

Light.—On Mogotes point stands a lighthouse 115 feet high, from which, at an elevation of 180 feet above high water, is exhibited a *revolving* white light *every minute*, flashes *thirty-two seconds* and eclipsed *twenty eight seconds;* the light should be seen in clear weather from a distance of 20 miles.

Andres head, about 10 miles SW. of Mogotes point, is the SW. extremity of a range of bold cliffs about 70 feet high, which extend half way between that head and Mogotes point. Where they terminate the shore is low, sandy, and rocky. The bight between Mogotes point and Andres head is foul and dangerous; many sunken rocks lie near the shore, causing blind breakers at sudden intervals. A short distance from Andres head is the Estancia de la Sociedad (Society farm).

Tides and currents.—It is high water, full and change, off Andres head at 10h., rise 8 feet. The flood sets to the northward and the ebb to the southward. The currents between Andres head and cape San Antonio set strongly to the northward previous to and during southerly winds; and as strongly in the opposite direction under contrary circumstances. From one to 3 miles are usually the limits of strength, although there are intervals when no current is perceptible; and times, although rare, when its strength may exceed that above mentioned.

Coast.—The coast from Andres head to Hermeneg point, 12 miles to the SW., is rugged, and from 20 to 30 feet in height. There are a few detached irregular cliffs, and some gaps, or creeks, which might afford a landing place for a boat in fine weather; but there is neither shelter nor anchorage for a vessel. Close to Hermeneg point is a bight, into which runs a small stream of fresh water.

Very few bushes appear on this part of shore, and scarcely a tree, excepting a few near the Estancia de la Sociedad. Sometimes a considerable extent of grass land is seen, but in most places near the sea the ground appears sandy and barren, thinly covered here and there with coarse grass, or by low prickly shrubs.

From Hermeneg point to Black point, and thence onwards to Asuncion point and mount Hermoso, to the westward, the coast has a similar appearance, and is equally unfit to approach. Occasionally the sandhills rise to 100 or 130 feet above the sea, some are more than usually barren, or there are a few more bushes, and rather more grass, to vary the view; but there is no other variety in this tiresome coast. The Gueguen, or Josef, river runs into the sea about 5 miles eastward of Black point. Its entrance is accessible to boats during moderate weather, when there is not much swell. A heavy swell is generally rolling towards the exposed shore.

Caution.—If a vessel finds it necessary to anchor near any part of the coast, great care must be exercised in weighing anchor. The bottom generally consists of hard tosca, covered by a thin layer of fine brown sand and broken shell. Tosca is a sort of clay almost as hard and tough as a two-thirds baked brick. The action of the sea wears holes in the upper surface, in which the anchor flukes become fixed. By heaving up and down and then waiting for a few minutes before attempting to break ground, the tosca will probably crack or crumble and give way before the steady strain; but if a sudden strain is applied the anchor or chain will part sooner than the tosca.

El Rincon, or the Corner, is the deep bight formed by the sudden change in the direction of the coast on each side of Bahia Blanca. Generally speaking it is shallow.

In El Rincon, and along the coasts to the eastward and southward, the lead will invariably bring up sand, or sand mixed with broken shell, and perhaps some gravel; but the quality and color of the sand is very different in different situations, and should be carefully noticed, whether with a view to anchoring in good ground, or avoiding any of the numerous and very dangerous sandbanks along the coasts between Bahia Blanca and the rio Negro. On and near the banks the sand is always of a dark brown color, very fine, and generally unmixed with other substances; sometimes pieces of shell come up on the lead; seldom anything else. If an anchor be let go upon this sort of ground, its recovery is doubtful. There may be soft ground underneath, but rarely; most of the banks are formed of tosca (hard clay), and this very fine dark brown sand is simply the tosca pulverized. In the offing, over soft ground, the sand is speckled, or black or white, rather fine generally; when coarse it is mixed with gravel; broken shell are frequent, though they do not occur so regularly as to assist in ascertaining a vessel's position.

Having such soundings as those last described, the seaman may be certain that his vessel is out of danger from a shoal, and that if necessary an anchor may be dropped with confidence. At night, if the weather be moderately fine and the wind off shore, it is better to anchor than to keep under sail. South or east winds send a swell into El Rincon, which obliges vessels to keep under sail, but north and west winds prevail during at least four days out of five.

Asuncion point, 95 miles westward of the Gueguen river, is the termination of a projecting sandhill 120 feet above the sea, difficult to distinguish with certainty, yet the most marked feature of this unvaried coast.

Shoal.—At the distance of 17 miles S. 56° W. (S. 45° W. mag.) of Asuncion point, and at 6 miles from the shore, there is a shoal with only 13 feet water.

In this vicinity the shore should not be approached within 8 miles.

Sierra Ventana is a mountain 3,500 feet above the sea; an extraordinary height in this low country. It derives its name from a hole in it near the top resembling a window. It is situated about 75 miles NW. by W. of Asuncion point, and the Gauchos call it monte Hurtado, implying that it is out of place.

When seen from the SE. the summit is peaked; from the south it appears rather square, with a notch in the middle. A good bearing of this mountain and the latitude of the vessel will fix her position with certainty. In very clear weather the peaks may be visible from the distance of 65 miles.

Tides.—It is high water, full and change, in El Rincon about 5h.

The tidal stream set strongly, the flood to the north, the ebb to the south, nearly 6 hours each way; off Asuncion point the flood sets to the eastward. They are much influenced by the winds, their strength varying from one to 4 knots when within 10 miles of the banks or land; and from ½ knot to 2 knots when between 10 and 20 miles from the outer limit of the dangers.

Directions.—Sailing vessels when bound for El Rincon, if the weather threaten or the wind be southerly or easterly, should stand off shore during the greater part of the night. Heaving to, or making free with the land, is not to be recommended on any coast, much less on this, which is considered, by those who have frequented it during many years, to be most intricate and dangerous.

The land is extremely low, almost flat in most places. The banks are extensive and suddenly steep. A vessel may shoal the water from 10 to 2 fathoms in the distance of ¼ mile, even while out of sight of land from the deck. To these inconveniences should also be added strong tides and gales from the SE., which bring thick weather and a heavy sea, overfalling and breaking as it approaches the banks.

When steering toward El Rincon, if the object be to anchor in or near Bahia Blanca, the northern shore between Black point and Asuncion point should be kept in sight from aloft; or the ship should be kept between the parallels of 39° 5′ and 39° 15′. Eastward of Asuncion point the land may be approached as near as may be thought proper.

Westward of Asuncion point, and thence along shore, the soundings are irregular within 8 miles of the land, and more caution must be used. Ridges of tosca extend out in a SE. direction 5 to 10 miles from the shore. These ridges are so frequent and so regular, that crossing them from NE. to SW. gives one the idea of a vast ground swell, the hollows of which are occasionally 6 fathoms lower than the risings, and about 400 yards from one hollow to another; the depths shoal suddenly from 8 to 6, and at times from 10 to 4 fathoms; and the water deepens again as quickly as it shoals. The shoal of 2¼ fathoms, 6 miles from the land, and 17 miles S. 56° W. (S. 45° W. mag.) of Asuncion point, must be avoided; it is absolutely necessary, therefore, to keep fully 8 miles from the land.

When 30 miles to westward of Asuncion point, and about the parallel of 39° 10′, the sierra Ventana may be seen, if the weather be very clear, bearing about N. 34° W., (N. 45° W., mag.) distant 65 miles. If not seen, the distance of the vessel from the north shore should first be ascertained; either by latitude or by steering N. 11° E. (north mag.) with attention to the lead and the lookout, until the water shoals to 8 or 7 fathoms, if the land be not seen previously to obtaining that depth. Thence a course may be steered to make the yellow buoy moored off Bahia Blanca nearly 12 miles S. 6° E. (S. 17° E. mag.) of mount Hermoso, or for the anchorage eastward of that mount.

Port Belgrano (Bahia Blanca), formed in the bight of El Rincon, is the first port southward of the rio de la Plata. It extends 38 miles inland and terminates in a creek. This port has been visited by few vessels, but has recently derived considerable commercial importance. The channel from No. 1 buoy to punta Pipa was resounded by H. M. S. *Sylvia*, 1883.

H.M.S. *Amethyst*, drawing 19 feet, and H.M.S. *Rambler*, drawing 13½ feet, have entered port Belgrano. The *Rambler* proceeded to the inner port of Bahia Blanca.

Mount Hermoso, on the north side of the entrance to port Belgrano, is a round hill 120 feet in height, with a spar on its summit on which is exhibited the light. It is close to the sea at the north side of entrance to port Belgrano, and is conspicuous when seen from the eastward; from the southward, this little mount is confounded with the adjacent land, and by a stranger would hardly be made out; westward of it the land is lower, and is not at first visible. Below the mount a low cliff of about 12 feet in height will be seen; it is the only one hereabouts, and is named Parrot cliff.

Telegraph.—A signal station is established at mount Hermoso, which enables vessels to communicate with the town and the pilots; here also is a station for the relief of shipwrecked crews, where temporary shelter and food will be supplied.

Hermoso road with a depth of 6 fathoms lies about 4 miles S. by E. of the mount.

Light.—A fixed white light is exhibited from a mast on mount Hermoso, and is reported to be visible from 7 to 15 miles.

The northern shore, from mount Hermoso westward, is low, being a succession of sandhills, partly covered with shrubs and rough grass. Anchorstock hill, 15 miles westward of the mount, is the highest (57 feet) and most peaked of the hummocks seen to the northwestward; about 2½ miles eastward of Anchorstock hill is a tripod beacon, a useful mark when entering the port. Westward of Anchorstock hill the coast trends westward to punta Cigueña, off which there is anchorage, and to punta Alta, a distance of 5 miles; thence in a NW. direction for about 10 miles to the inner port of Bahia Blanca.

The south shore of port Belgrano is formed by Zuraita island, a low, flat, marshy island intersected by creeks. The tops of some of the bushes may be seen from the masthead, when approaching from seaward, but the island will not be seen.

Pilots.—The services of a pilot off the entrance of the port can not be depended on. Pilots reside at punta Pipa.

Should the signal for a pilot not be attended to, vessels should endeavor to reach the anchorage abreast No. 8 buoy, off punta Cigueña, from which position they can be seen from the town.

Wrecks.—Two wrecks lie respectively 1,800 yards S. 34° E. (S. 45° E. mag.) of Anchorstock hill, and 1,400 yards S. 2° W. (S. 9° E. mag.)

of the tripod. The latter shows conspicuously from eastward or westward, appearing as a rock detached from the land.

Dangers at entrance.—The banks at the entrance have undergone some alteration since Capt. Fitzroy's survey. From punta Alta to Naposta river, a distance of 9 miles, the channel has undergone considerable change, and vessels drawing more than 10 feet are recommended to take a pilot.

The dangers to be guarded against in entering port Belgrano are two extensive shoals, namely, the Toro on the SW. and north bank on the NE., which nearly block up the entrance. The narrowest part of the channel, about ½ mile wide, is between what is called the East and West Gate posts.

The banks are all hard, of fine dark brown sand where they are steep and dangerous, of coarser and lighter colored sand where flat, and safer to approach. The Toro and the eastern extremity of the north bank are instances of the different qualities.

The fine dark brown sand generally lies upon tosca. In the channels between the banks the bottom is everywhere dark, soft, sandy mud. On and near the banks it is everywhere hard. In the offing, when in the fair way, the ground will feel rather soft and sticky; still farther off it is somewhat hard, being clay covered by speckled sand with broken shell.

The Great North bank, projecting southeastward about 10 miles from the north shore, shoals very gradually. The Toro bank and Horn spits are the reverse; from the deepest water between these banks it shoals so suddenly that there is hardly time for the best leadsman to give warning.

Breakers are sometimes found on the edges of these banks; at others, only ripplings. Sometimes there is not a mark on the water by which they can be distinguished by a stranger. In fine weather the water is smoother on the banks than it is in the channels, where there is a slight tide ripple. This is also the case with a fresh breeze at high water; but at low water, particularly with a breeze, breakers show themselves upon the banks in all directions. With or after SE. winds, as long as the swell lasts, there are breakers on all the banks.

Buoyage.—The Gateway or main channel leading to port Belgrano has a depth of 4¼ fathoms at low water, and has been buoyed by the Argentine Government.

There are seven buoys placed in the channel leading to port Belgrano. The first buoy, entering from seaward, is moored in 5¼ fathoms, painted yellow, and marked No. 1 in black figures. The buoy is conical, about 11 feet out of water, and is visible in clear weather from a vessel's deck at a distance of 5 or 6 miles.

The other buoys are painted red, and numbered from 2 to 7 in white figures.

Nos. 3, 4, 5, and 6 buoys should be in line with each other and with the tripod bearing N. 41° W. (N. 52° W. mag.). This is a good guide to ascertain if these buoys are in position. No. 7 buoy is a little to the eastward of this line. Half a mile northeastward of No. 6 the channel is at its narrowest, and care must be taken to make a N. 34° W. (N. 45° W. mag.) course from that buoy.

Directions.—The best time for entering is near low water, as the channels between the mud banks can then be seen; and guided by the buoys no great difficulty is experienced, but it should be observed that a heavy sea prevails with SE. winds. If the weather be thick it will be prudent to anchor or stand off.

In clear weather, if the vessel's position shall have been correctly ascertained, she may steer for the yellow buoy; otherwise endeavor first to sight mount Hermoso. This is not easy to make out, but will appear as the left extreme of the land when seen from the southeastward. No land will be seen to the westward; but from the masthead the tops of some bushes on Zuraita island, on the west side of entrance, may be seen.

Avoiding the eastern edge of North bank, pass the yellow buoy close-to and steer for No. 2 buoy, allowing for drift; thence N. 41° W. (N. 52° W. mag.) from buoy to buoy on the port hand in not less than 4¼ fathoms of water.

After passing No. 4 buoy the wreck of a vessel (formerly intended for a lightvessel, but which broke from her morings) will be seen on the East Gate post, and as her two lower masts are still standing she forms a useful mark.

Pass about 30 yards northeastward of No. 5 buoy, and westward of the wreck, and having arrived at No. 6 buoy a tripod will be seen on a sandhill to the westward of Nameless point. A bearing of the tripod will assist, if No. 7 buoy be not seen; but it should be seen if in position.

Arrived off No. 7 buoy, the vessel will be clear of the narrow channel, and will have entered port Belgrano; a N. 68° W. (N. 79° W. mag.) course should then be steered up the harbor, passing ½ mile north of No. 8 buoy (distant 9 miles from No. 7) and about ¾ mile off the north shore, in not less than 7 fathoms.

Caution.—The entrance to the port should not be attempted until the buoys are seen.

Anchorage.—The *Amethyst* found good achorage in 12 fathoms, sand and mud, about one mile below punta Cigueña, and one mile from the north shore of the port. In this berth the tides ran from one to 4 knots an hour. It is recommended to moor with a good scope of cable.

Channel to inner port.—No. 9 buoy bears N. 58° W. (N. 69° W. mag.) from No. 8, which is a little over a mile south of punta Cigueña. The line joining these buoys leads over the northern edge of the banks on the south side of the channel, extending about 1½ miles eastward of No. 9, in 3 fathoms. From a position about ½ mile northward of No. 8

buoy a course N. 62° W. (N. 73° W. mag.) should be steered, passing just northward of No. 9 buoy, which is close to the edge of the shoal. This part of the channel and onwards requires caution, and a vessel should not attempt it on a falling tide. From No. 9 buoy steer N. 65° W. (N. 76° W. mag.) with the pole on punta Pipa on the port bow, until a clump of trees near the Naposta river is seen between the East and West Entrance posts, about one-third of the way from the former to the latter; when the trees must be steered for on a N. 17° W. (N. 28° W. mag.) course, passing between the above two posts which mark the entrance of the narrow channel to the inner port of Bahia Blanca.

These posts are about 30 feet high and supported by wire stays; the East post has a small triangle on it. Thence the east side of the channel is marked by posts, which, if passed at about 80 yards distant, will lead in 14 feet at low water until abreast of Naposta river, where, extending across the inlet, there is a bar with only 7 feet at low water on its deepest part. At high water there are depths of 17 to 20 feet on the bar, and vessels drawing 19 feet have passed over the bar.

Having crossed the bar, keep in mid-stream, and moor in about 4 fathoms at low water, at a convenient distance from the railway pier.

Bahia Blanca is about 5 miles to the NNW. of the entrance of Naposta river; the town has a population (1892) of 5,000, and is increasing in importance. The Great Southern railway and telegraph connects Bahia Blanca with Buenos Aires; the terminus, named Puerto Nuevo, being at a pier one mile westward of the low water entrance of the Naposta.

There is a depth of 26 to 28 feet at low water alongside the outer part of this pier; other wharves for loading alongside are in progress.

Anchorage.—For ½ mile on either side of the pier good anchorage with smooth water will be found. The best holding ground is SE. of the extremity of the pier in 21 feet, mud. The holding ground near the landing place is bad.

Supplies.—Fresh beef and other provisions can be obtained; also fish by the seine. Deer, ostriches, partridges, and a bird like a small crested guinea fowl are to be found in the neighborhood. Water may be obtained from the wells under Anchorstock hill and at the inner port.

Coal.—There is no coal depot; the railway company has coal, but can not sell it without the permission of the Government. There are no lighters; a vessel would have to coal alongside the pier.

Dues.—Pilotage varies from $25 to $60, according to where the pilot is taken on board; not compulsory. The light dues for sea going vessels are 7 cents per ton—3½ cents for entering and 3½ for clearance. For visit of health officer the charge is 2 cents per ton; vessels not having a clean bill of health, 4 cents per ton. Wharfage is 4 cents per ton per diem for the first 100 tons and one cent per ton per diem for the remainder of registered tonnage.

Water.—Water is laid on to the pier, and may be obtained from the railway company.

Winds.—The prevailing wind is NW., which blows very strong, but this wind is local and seldom extends far seaward. When the NW. wind has blown for some days it shifts to SW. and SE., which winds sometimes blow with great strength. Thick fogs and heavy dew are experienced with north and NE. winds.

Tides.—It is high water, full and change, at port Belgrano at 6h.; springs rise 16 feet; neaps 13 feet. The rise of tide, however, is much influenced by the wind; NW. winds lowering the level, SE. winds raising it. In the entrance the tide runs between and parallel to the banks, nearly NW. and SE., from one to 3 knots.

Falsa bay, the next inlet to southward of port Belgrano, is an extensive and dreary waste. Sandbanks surround it, and neither land nor landmarks can be seen until a vessel is within its banks. The remarks on the precaution necessary and on the nature of the banks, just given in the description of port Belgrano, apply equally to Falsa bay, to Green bay, and to Brightman inlet.* As little is known of these places, they should not be attempted without local knowledge.

Between port Belgrano and Falsa bay are Horn spit, Lower Toro bank, and Lobos bank. The latter does not shoal so quickly as the others; but it stretches out to the SE. at least as far as latitude 39° 21′ S. These banks should be carefully avoided. A large part of the Lobos uncovers at half-ebb.

Labyrinth shoals.—South and west of Falsa bay the Labyrinth shoals, nearly all under water, extend to the SE., from Ariadne island to the parallel of 39° 27′. Here and there a patch of sand is uncovered temporarily, and affords a resting place for seals. When near these shoals some rising ground will be seen on Green island, appearing rather high, because surrounded by a dead flat, although only 60 feet above water.

Paz bank, the SE. extremity of the labyrinth shoals, is the most outlying and very dangerous. There is about 4 feet water on it, and its seaward side shoals gradually. As the land is in sight from the vicinity of this bank, it is not difficult to avoid it during daylight; the heights upon Green island bear from it about NW. by W., 8 miles, the nearest point of the island is distant 5 miles.

Green bay, formed to the SW. of Paz bank, is beset with shoals in its western part, though the entrance appears somewhat tempting. If it be absolutely necessary to enter, keep close to Green Island bank, feeling its edge by the lead, and anchor to the northward of the narrow passage off the east end of Green island. Remember that the banks on the east side of entrance shoal suddenly, and that low water should be chosen as the time to enter.

---

*As the survey of this portion, which is probably subject to constant alteration, was made in 1883, little reliance can be placed in the chart or the directions.

Brightman inlet is formed between Green island and Labyrinth head. A spit extends in a southerly direction from Green island to lat. 39° 29′ S., and between the spit and the western shore is this narrow bar harbor, which at a distance looks like a large river. On the south side of entrance the land is level and rather low, terminating in Labyrinth bluff, 40 feet in height. On Green island are some peaked hillocks, rising 60 feet above the sea; and at the southern extremity of the island is a single hillock, of use as a mark. At low water there were 2 fathoms on the bar, which is about 400 yards wide.

It appears probable that a creek fordable at low water is the only separation between Green island and the main.

Green island has an excellent soil, and with its good anchorage and deep water close to the shore, is capable of much improvement. At the NE. point, between the hillocks and Green bay, there is an eligible spot for a settlement.

Supplies.—There is abundance of game on the main and on Green island. Good water may be obtained by digging wells, about 8 feet deep, on the island. Plenty of fuel may be cut on the mainland.

Tides.—It is high water, full and change, in Brightman inlet at about 5h.; springs rise 12 feet, neaps 8 feet. The flood tide sets across the entrance, therefore a vessel should keep to the southward sufficiently to insure a proper position. There is only half an hour's interval between high water in the inlet and in the offing. The strength of the tide stream is between one and 2 knots.

Directions.—A vessel approaching Brightman inlet, with a view of anchoring, should not go to the northward of lat. 39° 30′ S. Farther south will be still safer, because the coast between the inlet and the rio Colorado is quite free from outlying dangers, while to the northward of that parallel the banks are extensive and dangerous.

Coast.—The coast from Labyrinth head trends in a southerly direction, to the mouth of the rio Colorado, a distance of 25 miles, and is quite free from dangers of any description. The water shoals regularly, and a vessel may close the low land as convenient by the lead. A range of sandhills, between 30 and 40 feet in height, extends parallel to the shore. The beach is sandy, and in some parts dries off more than a mile at low water.

At the entrance of the Colorado the sandhills end abruptly, forming a low but distinct headland. Flattop hill is a sandhill covered with verdure, rising to the height of 40 feet, at ¾ mile north of the river. It is the highest about that part of the coast, and may easily be recognized by a stranger.

Rio Colorado rises at the foot of the eastern slope of the Andes, and after a course of above 550 miles in a general SE. direction flows into the sea, at 7 miles north of Union bay. The river is accessible to coasters of 7 feet draft. The bar, about one mile off the entrance, and the banks inside the river, are continually changing their position.

The entrance to the river may be known by the abrupt ending of the sandhills. South of the river the land is flat and low. When east of the river's mouth, trees (a kind of willow, and the only trees on the coast) will be seen growing on the banks, a short distance inshore. The entrance to the river is not more than 100 yards in breadth, and has only 3 feet at low water. It is difficult to enter, even with the flood tide, unless the wind is fair, and not too strong. The stream of the river makes the flood tide weak; the ebb runs very strong. A strong SE. or easterly wind throws so much sea upon the bar that it is then useless to make the attempt.

Caution.—No vessel, however small, should attempt to enter while there is a swell on the bar. It is also prudent to wait during one low water at the entrance, in order to see which is the best channel. It is the only safe way. Sometimes the water is fresh outside the bar.

Union bay, 7 miles southward of the Colorado, is adapted to the use of vessels drawing less than 17 feet. In smooth water, with a fair wind, a deeper draft vessel might enter, as there is not less than 5 fathoms in the fairway at highwater.

Indian head, the north point of the bay, appears as an island when seen from the northward, the land westward of it being very low. It is 25 feet high, bluff to the SE., composed of sand hillocks partly covered with bushes, and cannot be mistaken; as it rises from very low land, which nowhere exceeds 20 feet in height, and is in many places almost level with the water at ordinary spring tides. Creek hills are three hillocks about 70 feet high, and situated 2 miles NW. of Indian head. A little to the westward of Indian head is a creek, which passes close to Creek hills, and through which boats may work their way to Colorado at half tide. Firewood is scarce about Indian head, but good water may be obtained by digging a few feet into the sand.

Union bay will be of great advantage when the banks of the Colorado are inhabited and cultivated. All intercourse with that river, and by that river with the interior, must be carried on through this bay, which has so good a port, entirely sheltered, landing places so practicable, and the whole so accessible if lighted and buoyed.

Banks.—The chief dangers to be guarded against in approaching and entering the bay are, the Serpent bank, the Dog bank, and the tide which sets across them. The Serpent bank extends in a long ridge 4 or 5 miles in an easterly direction from Indian head. As far out as 2 miles from the land it dries at low water. It shoals gradually on the north, but rather suddenly on the south or channel side. The Dog bank extends in a similar manner to the eastward from the south point of the bay, but is of greater extent. The water shoals upon its edge rather quickly.

The quality of the bottom alters as the vessel approaches these banks, as it does in the other inlets and harbors of this coast. In the middle of the channels there is soft, dark colored sandy mud; near and upon the banks there is hard, fine, brown sand.

Tides.—It is high water, full and change, in Union bay at 3h. 10m.; springs rise 12 feet, neaps 9 feet. The flood tide at the entrance sets to the northward across the banks about 2 miles an hour. The ebb tide, from 2½ to 3 miles an hour, sets right out at first, and then more to the southward as it clears Dog bank.

Directions. *—Vessels intending to enter Union bay should make the land about the rio Colorado, where the coast is clear and the lead may be trusted. Look out for Flattop hill, 40 feet high, just north of the Colorado, and when it bears N. 67° W. (N. 79° W. mag.), and is distant 5 miles, the depth will be 5 to 7 fathoms, sand. From thence steer S. 5° E. (S. 17° E. mag.), or rather make good that course until the water shoals upon the north side of the Serpent bank, or until Creek hill bears west (S. 78° W. mag.) Starve island, and perhaps a part of the SW side of Union bay, may be seen at the same time as or soon after Indian head.

On Starve island there is a peaked hillock (the middle one of three), which may be of use when crossing the tail of the Serpent. It must be kept to the westward of S. 68° W. (S. 56° W. mag.) while crossing, in order to insure having sufficient water. When Creek hill bears west (S. 78° W. mag.), and Indian head S. 74° W. (S. 62° W. mag.), steer S. 33° E. (S. 45° E. mag.) 5 miles (by ground log), then S. 35° W. (S. 23° W. mag.), until Indian head bears N. 61° W. (N. 73° W. mag.), when steer for it on that bearing (allowing for tide) until the vessel is between the Serpent and Dog banks, and between 2 and 3 miles from the head; then steer N. 84° W. (S. 84° W. mag.), and anchor with Indian head N. 11° W. (N. 23° W. mag.), distant ½ mile, in 4 fathoms at low water, over soft muddy bottom.

This anchorage is preferable, because of ready communication with the shore. Mud flats extend so far from the land in all other parts, that at low water a boat cannot land.

Anegada bay.—That portion of coast lying to the southward of Union bay, between Indian and Rubia heads, a distance of 38 miles, is appropriately named Anegada (lowland overflow) bay. Through it there are numerous creek communications, by which a boat may proceed to Union bay, and thence to the Colorado.

Sandbanks.—Extensive sandbanks stretch from 10 to 15 miles seaward, off the whole of this coast, some of which appear soon after first quarter ebb. At high water very little dry land can be distinguished, from the outer edge of these shoals, even from the masthead. Every vessel, therefore, should give these shoals a wide berth, more particularly when bound northward, as the flood tide sets northwestward towards the banks from one to 3 miles an hour. These shoals are in ridges parallel to the coast, with depths of 2 to 6 fathoms on them, and from 8 to 12 fathoms between.

---

*See foot note, p. 341.

There are always breakers near the edges of the bank; but on the dangerous ridges, where the depths are only 2 or 3 fathoms, there are no breakers in fine weather. A slight rippling, or an unusual smoothness, and some difference in the color of the water, are, with the soundings, the only warnings of these dangers. When there is much swell the whole extent of the banks is shown, even where there are 4 or 5 fathoms water over them.

Viper bank and the tail of the Snake, with their accompaniment of parallel ridges, are extremely dangerous. In proceeding to the southward there is less danger if the lead be carefully attended, because, the water shoaling upon the outside bank first, the vessel may at once haul off to seaward.

Strong southerly winds raise the flood tide, causing it to run from a half to one hour longer and with more strength. Strong northerly winds have a diminishing effect upon the flood, but they make the ebb run stronger and cause the water to fall unusually.

While passing these banks, Creek and Deer islands may be seen from the masthead if the weather be clear, but it is better to keep so far off as not to see land at all.

Northeast sands extend 10 miles eastward from the shore of Deer island; but the depth is only 3 fathoms at 13 miles S. 70° E. (S. 82° E. mag.) from the north point of the island. The southern portion of Northeast sands terminates in San Blas harbor, and is the northern side of the channel.

San Blas harbor is formed to the southward of the low islands and extensive sandbanks of Anegada bay. Although opening into an extensive and well sheltered harbor, the entrance to San Blas is considerably obstructed by banks, which cause strong tides in the narrow channels between Northeast sand and Rubia head, its southern point of entrance.

San Blas banks.—These banks, named Hellgat, Middle, East, and Northeast banks, extend for a distance of 6 miles southward of the entrance to San Blas harbor, with three navigable channels. The center one, named Constitucion channel, 800 yards wide, with a depth of about 19 feet at low water springs (in 1888), or less water than is charted; it is buoyed, and with proper precautions it is said to be not difficult of access.

Settlement.—The settlement is about 3½ miles within Rubia head, on the south shore, and off which there is secure anchorage. There is frequent communication with San Carmen, on the rio Negro, about 40 miles to the southwestward direct.

Climate.—There is no rainy season, but during winter there are occasional though not heavy rains. During most summer nights there is no dew.

Beacons and buoys.—A square tower 22 feet in height and painted in black and white horizontal bands stands on the sandhill over

Rubia point, 6 miles southward of Rubia head; its summit is 70 feet above high water, and visible from a distance of 12 miles. A post has been erected near the shore, at 3 miles northward of Rubia point tower, to assist small craft when entering by the west passage.

Four large conical buoys, said to be visible about 5 miles under favorable circumstances, have been placed on the west side of Constitucion channel, in a general NNW. direction, and about 1½ miles apart; but neither the color nor position of the buoys can be depended on.

No. 1, or bar buoy, lies in 5 fathoms, about 200 yards from the SE. extreme of Middle bank. No. 2 buoy, in 6 fathoms, is distant $1\frac{6}{10}$ miles from No. 1 buoy, and marks the east side of Middle bank. No. 3 buoy lies in 4½ fathoms, N. 43° W. (N. 55° W. mag.) distant $1\frac{3}{10}$ miles from No. 2 buoy. No. 4 buoy, in 6½ fathoms, marks the east side of Hellgat bank, and is distant $1\frac{2}{10}$ miles from No. 3 buoy. On account of the strong tides and other circumstances too much dependence must not be placed on the buoys maintaining these positions.

Directions.—Constitucion channel.—On account of the strong tides which prevail off San Blas, and the dangerous set of the flood on to the banks at the entrance and to the northeastward, sailing vessels, with flood tide, should make the land about Raza point well to the southward; with the ebb or southerly set, the land might be made about Second Barranca or Rubia points; the tower on the latter is a good landmark. The best time for vessels to cross the bar is at the last of the ebb, when the banks, though not dry, are rendered plainly visible by the sea breaking over them, and are said to afford a sufficient guide at that state of the tide, even in the absence of the buoys.

A vessel will thus also have the first of the flood to carry her to the anchorage. With Rubia tower bearing N. 78° W. (west mag.) distant 6 miles, a course N. 11° W. (N. 23° W. mag.) for 2½ miles should take a vessel to the outer bar buoy, marking the west side of entrance to Constitucion channel; pass about 400 yards eastward of the buoy, in about 19 feet at low water, the least depth on the bar (in 1888); the same course will carry a vessel to No. 2 buoy; thence to No. 3 buoy the course is N. 33° W. (N. 45° W. mag.) or for Rubia head; and from No. 3 to 4 buoy, N. 11° W. (N. 23° W. mag.) until Rubia head bears about S. 57° W. (S. 45° E. mag.) when the vessel will be in Broad channel, and should keep near the south shore, which is steep-to, as far as the anchorage.

When working through Constitucion channel, vessels may stand over towards East bank by the lead, as the shoaling of the water is gradual, but Middle bank is steep-to and gives no warning. Also, when working up Broad channel, within Rubia head, do not stand far over to the north shore, as the water shoals suddenly to 3 fathoms and less.

The flood tide sets strongly towards East bank, and the ebb towards and over Hellgat and the northern part of Middle bank, and in the southern part of Constitucion channel towards East bank. Its velocity is from 2 to 4 knots, the flood being somewhat stronger than the ebb. SE. gales will increase the velocity at times to 5 knots, and have been known to augment the rise of tide by several feet.

West passage lies between Hellgat bank and the shore, to which Hellgat bank is connected at both extremes. Being near the shore and protected by the extensive banks to the eastward, this channel is much smoother than the Constitucion, and is recommended for boats; it may be taken by steamers or sailing vessels of 10 feet draft, but it is not recommended for sailing vessels except with a fair and steady breeze.

Its outer and southern bar, at one mile northward of Rubia tower, has a depth of 11 or 12 feet at low water; its northern bar, just northward of Rubia head, has but 5 feet, but it may be avoided by crossing Hellgat bank, about midway between these bars. The tides run fair through West passage at a rate of 3 knots. To enter, steer for the post beacon at 3 miles northward of Rubia tower, bearing N. 28° W. (N. 40° W. mag.) until Rubia tower bears S. 57° W. (S. 45° W. mag.) where the depth should be 4 fathoms; then alter course to N. 15° E. (N. 3° E. mag.) crossing the south bar in about 12 feet at low water; when the tower bears S. 43° W. (S. 31° W. mag.) it should be brought astern, and kept on that bearing, which apparently leads across the Hellgat in 15 feet least water; when the water deepens to 4 fathoms the vessel will be in Constitucion channel, and should then steer for No. 4 buoy.

East channel, being so far from the shore, and also near the dangerous Northeast banks, is not recommended; but it appears to have as much water as Constitucion channel. It is not buoyed.

Anchorage.—The best anchorage is in 14 fathoms, off the watering place, 4 miles within Rubia head, at ½ mile from the beach, secure from all winds, and well sheltered from the SE. Moor, with open hawse to the south.

The beach is steep-to, having 6 fathoms a few yards from it. The bottom is stiff sandy mud, covered with coarse gravel and shingle. Boats may land here in any weather.

Supplies.—There is a plentiful supply of good water in the wells near the beach in San Blas harbor. From one of these wells, formed by sinking two casks in the ground, one placed above the other, a vessel obtained 5 tons of water in one day.

Fuel is scarce in the immediate neighborhood, but can be procured in quantity, and of good quality, by sending to the inhabitants, who bring it from the interior in carts. It is called Peccolini, is the best fuel on this coast, and perhaps as good as any wood for burning. Iron may be brought by it to a welding heat. Fresh provisions may be procured in abundance. Fish are plentiful.

Tides.—It is high water, full and change, at Rubia head at 1h.

30m., in the harbor at 2h.; springs rise 12 feet, neaps 10 feet; but it is affected here, as elsewhere on the coast, by the wind.

The tides run along this coast with dangerous strength, from 2 to 4 miles an hour. The flood is the strongest by nearly a mile, and as it sets directly towards the outlying banks, a vessel must, when near the entrance, with the flood tide running, if not going to enter the harbor, stand to the southward, or anchor, and wait for the ebb. With the flood tide, weighing would be out of the question.

With and after a gale from the southeastward both channels and banks are covered with heavy rollers and breakers. At such a time it would be highly improper attempting to enter. The last part of the flood tide comes from the northward, from Anegada bay, at which time the tide is beginning to ebb at the Gats.

Coast.—The coast between Rubia head and Rubia point, and southward to the rio Negro, is a line of sandhills, few as high as Rubia point, here and there partly covered by rough grass and by low prickly shrubs. From Rubia point to the bar of the Negro, the coast may be more closely approached, for there are neither shoals nor rocks when one mile from the beach, and the lead may be trusted; but the tides set strongly from 2 to 4 miles an hour, following the coast nearly 6 hours each way, so that a stranger, unaware of their existence, might run aground on the banks near San Blas, thinking himself to the southward of Raza point. On nearing the Negro, the sandhills are lower; some of a different character just show inland.

Rubia point, situated about 7 miles southward of Rubia head, is 40 feet high; and Second Barranca point 11 miles to the southward, a similar hill, is covered with shrubs and grass, and has a low cliff in front of it, the only one hereabouts, and is therefore remarkable.

Raza point, 18 miles southward of Rubia head, has a round sandhill about 30 feet high on it, and there are three or four flattopped sandhills about 5 miles to the SW. Some persons have mentioned these hills or rather hummocks as remarkable, and as sufficiently showing which is the point; but a stranger may find difficulty in recognizing them, particularly as their form may sometimes be changed by gales of wind.

The Rio Negro, separating the provinces of La Plata and Patagonia, flows into the sea between Redonda or Main point on the east and Medano point on the west. These points are fronted by extensive banks between which is the bar and channel into the river. The NE. bank is hard sand and shingle. The SW. bank is chiefly a quicksand, fine, and dark colored; during one night a vessel of 60 tons burden was buried in it, although the water was smooth with little swell.

South Barranca hill, situated about 3 miles southward of rio Negro, is a range of perpendicular cliffs 200 feet high, rising suddenly from the low land at the entrance to the river; this, with the North Barranca hill 160 feet high, 6 miles eastward of the river, will assist in identifying the entrance.

Heavy gales assist the torrents from the interior in altering and shifting the banks at the entrance; yet the main channel over the bar is stated to vary but little. But in places in the river, where formerly there was a depth of 3 fathoms, it has been reduced to about 3 feet.

Main point and Leading hill.—Main point is a hummocky sandhill 40 feet in height, with a beacon surmounted by a cask, and a signal mast on it. From the eastward it appears as 3 hummocks, tolerably covered with verdure.

Flat point, on the eastern bank, nearly a mile within Main point, is sandy, 25 feet high and covered with verdure. It shows a steep side to the SW., is wedge shaped, and a leading mark into the river.

At some distance up the river two headlands will be observed, one of which, Leading hill, about 6 miles northwestward from Main point, is 130 feet high, and the mark of most use in entering the river. It may be seen from 3 to 4 miles outside the bar. It is the higher and the more eastern of the 2 headlands, having a small roundtopped hillock at the SW. extremity, which slopes suddenly to the SW.

Medano point, the west point of entrance, is bare and sandy. In very high tides it is overflowed, when the entrance of the river would appear three times its usual breadth. South point is a cluster of sandhills ½ mile to the NW. of Medano point. Both Main and Medano points are steep-to when abreast; by closing them, the opposite banks, which are dangerous, are avoided. Abreast of Main point the channel is only 300 yards in breadth.

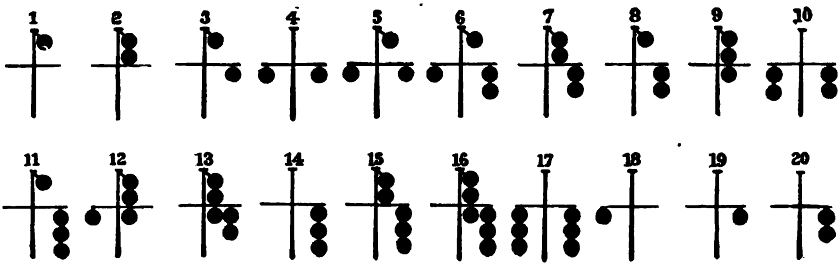
Supplies.—Fresh provisions, in moderate quantities, some firewood, plenty of vegetables, and, during the season, abundance of excellent fruit, may be procured at San Carmen, a town situated on the side of a steep sandstone bank, on the northern or left bank of the river, 17 miles from the entrance. Encouragement and protection would make this a thriving settlement. The climate is delightful, the soil on the banks extremely rich, and watered by the periodical overflow of the river.

Bar.—The passage across the bar is not more than 200 yards wide, and at low water there is only a few feet on it. The maximum draft taken into the river by the pilots (in 1880) was 12 feet. Though vessels of slightly deeper draft may enter, with smooth water, they are liable to be detained for some weeks in the river before they can get out. Such smooth water is rare on this exposed coast, and generally speaking, 11 feet is the utmost draft that may enter the river without incurring risk. The edge of the bar will always show either by breakers or by ripplings; rarely does a day occur on which there are no breakers; with any swell the breakers continue all round the bar, not excepting the channel.

Directly after high water, the ebb tide begins to set strongly out of the river, and over the NE. bank, and should a sailing vessel be met by it, she must either anchor or stand out to sea if not well inside the bar and in plenty of water. Very few vessels have escaped that have once grounded on the banks or bar of this river.

Leaving the river is rather more difficult than entering, because of meeting instead of leaving the southerly swell. There are instances of vessels having been detained 40 days at the entrance, waiting for an opportunity to cross the bar. No vessel should make the trial without a commanding breeze, for light winds are treacherous, and they blow different ways on the river. NE. winds are the best either for entering or leaving.

Bar signals.—The following signals, made from the signal flagstaff at Main point, denotes the state of the bar, and directions for entering the river, etc.



1. Vessels can not enter.
2. Vessels can enter.
3. Vessel is seen.
4. Pilot is going out.
5. Steer according to the signals made, or for the pilot boat.
6. Do not approach the bar, as the weather looks threatening.
7. Cross the bar, following the signals given by the pilot boat.
8. Approach the bar, as it is the time to cross.
9. Pilot can not go out for want of a boat; send a boat.
10. Cross the bar, which has a depth of 18 feet.
11. Vessels can not enter during this tide.
12. Pilot boat can not go out on account of the sea on the bar; pay attention to the signals.
13. There is only a depth of 12 feet on the bar.
14. Stand off until you have the landmarks in line; pay attention to the signals.
15. Remain off the bar until high water.
16. Approach the southern bay to meet the pilot boat.
17. Keep southward of the bar until the time for crossing, when you will receive signals for entering.
18. Keep more to port.
19. Vessel in the channel.
20. Keep more to the starboard.

The vessel must keep a flag at the masthead, dipping it when the signal is understood, then re-hoisting it.

Pilots.—A pilot, maintained by the Argentine Government, resides at the entrance of the river, and who comes off to vessels wishing to enter, if the bar is practicable.

Tides.—It is high water, full and change, on the bar, during settled weather, at 11h.; springs rise 14 feet, neaps 10 feet. In the offing, it is 3 hours later. The tidal stream runs parallel to the coast from 2 to 4 miles an hour.

The ebb stream in the river runs at the rate of 2 to 6 miles an hour, according to the wind, the body of fresh water coming down from the interior, and the state of the offing tide. The flood stream seldom exceeds 2 or 3 miles an hour. When an unusually great body of fresh water is brought down, the ebb is at the strongest; and, on the contrary, the flood tide is hardly to be noticed, though the water rises as usual. Like all large rivers having their sources in mountainous countries, it is subject to periodical inundations. The tide reaches a few miles above the town of San Carmen, during the dry season, where it is high water two hours later than at the mouth of the river.

Light.—On South Barranca hill stands a lighthouse 143 feet high, from which is exhibited a *fixed* white light, visible in clear weather from a distance of 14 miles.

Directions.—Anchorage.—In approaching the rio Negro it is best to make the land to the southward, about the False Sisters, or Bermeja head. Being certain of the latitude, and making proper allowance for the tide, may justify a direct course for the river, but on no account should a vessel incur a risk of being set to the northward of Raza point. The land about Bermeja head is high, the water free from danger, and if set out of her reckoning during the night or thick weather a vessel will not run the risk of getting ashore. Northward of Raza point the case is reversed, as the flood tide sets strongly towards the San Blas banks. Many vessels have been wrecked, owing to this cause.

With main point bearing N. 10° W. (N. 23° W. mag.) or more northerly, approach the bar of the rio Negro until the water shoals to 10 fathoms.

If circumstances do not admit of attempting the passage at once, anchor or stand off again. Good anchorage and a convenient place for waiting is southwestward of the bar, in 8 fathoms, sand, with Main point bearing N. 13° E. (north mag.), and the NE. end of South Barranca cliffs N. 55° W. (N. 68° W. mag.). While the winds have northing and westing this is a good roadstead; but it must be quitted directly the wind gets to the southward or eastward, if threatening to blow strong. Heavy seas are sent in by southerly gales, and the strength of tide should be remembered.

The proper time for crossing the bar is during the last quarter flood. The water does not rise during the last quarter flood, and it is of material consequence that a vessel should enter the river before the ebb tide makes out with strength. At this time the tide is setting strongly to the northeastward, along shore over the bar, and the difficulty is to avoid being set to the northeastward in crossing it. After high water this difficulty is increased, because the powerful ebb out of the river meets the tide flowing to the northeastward, along shore, and they together sweep over the eastern bank at the rate of 3 to 5 miles an hour.

Leading hill on with the summit of Flat point, or just open westward of Main Point beacon bearing N. 27° W. (N. 40° W. mag.) leads over the bar probably in the best water. (From its shoalest part, the north end of South Barranca bears about N. 88° W. (S. 79° W. mag.)*

Keep the marks on until the end of the South Barranca bears S. 81° W. (S. 68° W. mag.), then steer N. 37° W. (N. 50° W. mag.) until the Barranca end is S. 69° W. (S. 56° W. mag.). Thence steer direct for Flat point, passing close to Main point; having passed which, steer close to Medano point, and anchor in 3 fathoms, mud, westward of a line joining Medano and Flat points out of the strength of the tide, unless intending to proceed farther up the river.

From thence to the town of San Carmen (or Patagones), the chart and the lead will suffice. If a vessel should ground, with a flowing tide, smooth water, and soft banks, she will not be injured; but, both for the bar and for the river, a local pilot should always be procured if possible. The banks alter, more or less, every year, although the main channel is nearly stationary.

For boats there is a safer entrance than the main channel. They should pass the South Barranca in 4 or 5 fathoms water, and steer about N. 24° E. (N. 11° E. mag.) till some bare sandhills, rather inland, on the NE. side of the river, are distinguished. Steering for the second of these hills (South Channel hill) counting from the west, on a N. 33° E. (N. 20° E. mag.) bearing, will carry a boat at three-quarters flood into the river. At high water a vessel drawing 7 feet may thus cross the south bank. This is called the West channel, though channel there is none; but it is safer for boats to enter by this way, because they run less risk from blind breakers, which are common in the main channel. Also, if any accident does occur, the shore is close at hand, and the tide sets into the river.

San Carmen (or Patagones), the port of entry, is a town of about 3,500 inhabitants on the north bank of the river, about 18 miles from the entrance. On the south bank, opposite Patagones, is a flourishing settlement called El Merced.

The exports consist of hides, feathers, skins, salt, and Patagonian marbles.

There is telegraphic communication with Bahia Blanca and steamer communication twice a month with Buenos Aires. Also a line of coaches to Bahia Blanca three times a week.

Supplies.—Firewood, fresh provisions, vegetables, and fruit in season may be obtained.

---

* In 1880, the marks in use were, the beacon on Main point in line with another beacon, without ball, probably on Flat point; this may differ slightly from the old marks given above. In any case the river should not be entered without the assistance of a pilot.

CHAPTER XII.

PATAGONIA—RIO NEGRO TO CAPE VIRGINS.

The territory of Patagonia extends from the rio Negro to Magellan strait. The boundary line dividing this territory between the Argentine and Chilian republics by the treaty concluded with Chile in 1881 starts from Dungeness, the NE. entrance point of Magellan strait, passes in a curved line through mount Dinero, and by the highest ridges to mount Aymond, thence to the intersection of the meridian 70° W. with the parallel of 52° S., from which it extends to the watershed of the Andes. The Argentines keep a small military colony at the mouth of the Santa Cruz river in representation of their claims. Towards the Pacific, Patagonia is bordered by the southern Andes, many of the peaks of which are volcanoes. Towards the Atlantic the long eastward slope of Patagonia presents a succession of bare plains, grass covered in parts like the Argentine pampas. Several rivers, the largest of which are the rio Negro, the Chupat, and Santa Cruz, flow across the eastern slope to the Atlantic.

Climate.—The climate of southern Patagonia is very severe; the streams are frozen over till September, and the winter winds blow over the bare plains, driving clouds of snow and sand with great violence.

Races.—The Patagonian Indians are very few in comparison with the vast extent of country over which they wander. The Tehuelches, or southern Indians, are tall, fine people, nomadic hunters of the guanaco and ostrich. The NW. part is occupied by the Manzanas, a less nomadic people, possessing flocks of cattle and sheep, and allied in language to the Araucanians of southern Chile, on the opposite slope of the Andes.

Coast.—The coast from rio Negro trends in a SW. by W. direction 22 miles to Bermeja head, thence west and NW. 80 miles to port San Antonio, at the head of the gulf of San Matias. The range of hills commencing with the South Barranca, 200 feet high, near the rio Negro extends to Belen bluff, a distance of 50 miles, with the slight break in Rosas bay. Their greatest height is 300 feet near Belen bluff. Between South Barranca and near to Bermeja head the land inshore of the cliffs is so level as to appear parallel to the water line when seen from the southeastward.

The bar of the rio Negro is the only outlying danger between San Blas bay and port San Antonio.

Gulf of San Matias.—Bermeja head is an excellent point to make when approaching the rio Negro, San Blas bay, port San José, or port San Antonio. It will keep a vessel clear of numerous dangers which attend the approach to either of those places on a parallel, as is the frequent, but on this coast dangerous, practice. In the vicinity of Bermeja head the land is about 200 feet high.

Near the head there are hummocks and irregular hills nearly covered with verdure. At the northeastern part of these are two peaks, very small, yet showing distinctly when seen from the eastward. They stand nearly over two peculiar cliffs, which so resemble one another that they are known locally as the Two Sisters, the name originally applied to the west point of Rosas bay, which they resemble.

Bank.—Westward and southward of Belen bluff the *Beagle* had deep water excepting in one place, where two successive casts of only 15 fathoms were found, but the next cast gave no bottom; and as the shoal ledge could not be found again without great loss of time it was left unexamined. There certainly is, however, a ledge of rocks there, and perhaps with less than 13 fathoms over them. The water appeared light colored, although the night was very dark and the lead had been carefully attended. In all other parts of the gulf of San Matias there is deep water, with 30 fathoms from one to two miles off shore.

Tides.—The tidal wave comes up the coast from the southward and rushes round Valdes peninsula with much strength, causing violent and dangerous overfalls off Valdes creek and Norte point. Part of the body of water thus going northward separates and runs round Norte point; thence to the port of San José the tide sets strongly, with ripplings and races, dangerous for boats or very small vessels. The main body continues its progress to the northward, inclining to the west, until near Belen bluff, when it divides, one stream running to the NW., the other to the eastward. Eastward of Belen bluff the ebb sets faintly to the south or southeastward; westward of the bluff it sets to the southeastward.

West of the meridian of Norte point, the south point of entrance to the gulf of San Matias, and northward of latitude 41° 50′ S., but little stream of tide is felt, though the water rises 24 feet. With a weather tide there is a very cross short sea in the entrance of the gulf.

Tide creek.—At 10 miles westward of Belen bluff there is a tide creek, in which is a depth of 3 or 4 fathoms at high water, but at low water it is dry. Westward of this creek another range of cliffs, about 100 feet in height, commences, and, with one break, extends about 18 miles, the extreme point being named Cliff end. To these cliffs succeed low land, with a shingle beach. Near and inshore of the cliffs, to the westward of Bermeja head, are irregular ranges of hills tolerably covered with rough verdure. Rosas bay and Tide creek appear, when first made from seaward, like openings in the land, and the hills and cliffs on each side like islands.

Port San Antonio.—From Cliff end to Villarino point, a distance of 22 miles, the land is low, a few sandhills, partially covered with grass and stunted bushes, alone rise above the shingle or sandy beach. Villarino, the eastern point of entrance, is low and sandy, with a few hummocks about 40 feet high covered with rough grass and straggling bushes. Soundings will be obtained with the hand lead only within a few miles from the land.

Port San Antonio harbor is perfectly sheltered from every wind, and small vessels may be laid ashore for a tide. It may, therefore, prove valuable, notwithstanding its remote situation and the barren nature of the surrounding country. Distant 30 miles only from the rio Negro, perhaps the medium of future inland communication between Chile and the coast of Patagonia, it is well situated for commercial intercourse with the interior. The entrance, however, is much exposed to southeasterly winds, and at such times it would be imprudent to approach without a probability of speedily entering, as the vessel would be embayed and have to contend with a heavy rolling sea.

Supplies.—Game, fish, and fuel are abundant; water is only to be obtained by digging wells.

Banks.—On each side of the entrance is a bank, partly dry at low water and steep at the edges. Lobos bank extends south nearly 5 miles from Villarino point, and dries out nearly 3 miles from the shore. It is steep-to, shoaling suddenly from 7 to 3 fathoms; the western is named the Reparo.

Tides—It is high water, full and change, at port San Antonio at 10h. 45m. The rise depends upon the wind, being between 18 and 30 feet. Between Villarino point and the Reparo bank the tide runs from 3 to 5 miles an hour.

Southward of the entrance the stream of tide is not more than one mile an hour, but as the vessel nears Lobos bank its strength increases rapidly.

Directions.—Approaching port San Antonio, Direction hill and El Fuerte hills, on the NW. shore of the gulf of San Matias, will be seen before any of the lowland can be made out. If approaching from the southward, El Fuerte (Fort) is seen sooner than Direction hill; if from the eastward, the reverse. El Fuerte is 380 feet high, and it would be difficult to find a more singular resemblance to a regular fortification. Direction hill, 560 feet above the sea, has three small hummocks, close together, on its summit.

Nipple hill, the highest land hereabout, 600 feet above the sea, is on a range of hills northward of the port, having a small hummock on its summit resembling a nipple.

Steering toward the port, keep Direction hill bearing N. 53° W. (N. 68° W. mag.) until El Fuerte bears S. 38° W. (S. 23° W. mag.), from which position Nipple hill will be seen in line with the hummock on Villarino point bearing N. 26° E. (N. 11° E. mag.) easterly. Then steer in with the Nipple just open of the west extremity of Villarino point until the vessel is ½ mile from that part of the point, from whence steer by the eye, close to the bank on the east side, round the point, proceeding to the most convenient berth.

For a large vessel the best time is about two-thirds flood, but for most vessels the last-quarter ebb should be chosen as the time for rounding the tail of the Lobos bank, so as, if possible, to arrive off Villarino point at low water. When there all is safe and easy. The water is always smooth, and the only inconvenience is the rapid tide. A sheltered berth, suited to the object in view, may be gained by warping when the tide suits.

Caution.—It must, however, be remembered that the fairway is not sufficiently examined, particularly along the west side of Lobos bank; although enough has been done to ascertain and show the nature and practicability of the passage. Before entering in a large vessel the fairway should be examined, and shoal heads marked by the person who is to pilot the ship into the harbor, to insure his acquaintance with the marks, and to guard against any shifting of the banks which may have occurred in so rapid a tideway since the survey.

Outer anchorage is good in from 10 to 30 fathoms, between the end of Lobos bank and El Fuerte, as well as to the southward and eastward of that bank; the ground being quite clear, either fine sand or a soft, greenish, sandy mud. The shelter is good, excepting with SE. winds, which do not often blow, and still less often with violence.

Sierras de San Antonio.—Continuing along the coast southward from El Fuerte, the sierras de San Antonio next attracts notice. The highest part of this peaked range is about 1,700 feet above the sea, and visible from 20 to 30 miles from the land.

All this west coast of the gulf of San Matias is bold, exposed, and steep-to. From the point of the sierra, to the southward, the coast is chiefly cliffy, but with intervals of low land. The cliffs are from 100 to 200 feet high, nearly perpendicular, and are composed of loose earth, mixed with shingle and vast quantities of fossil shells. The shore is sandy, fringed by low water rocks.

Valdes peninsula, 53 miles long, north and south, by about 25 miles across, is joined to the main by an isthmus 20 miles long by 7 across, on the north and south sides of which lie, respectively, port San José and Nuevo gulf.

Port San José.—This basin is 24 miles in length and 10 miles in width, with an entrance from 2 to 3 miles wide; on each side of its entrance are bold cliffy headlands, from 100 to 150 feet high, with deep water to seaward, but a ledge extends from one to the other under water, causing, when the wind opposes the tide, a heavy rippling. The port is free from interior obstructions or danger, but the entrance has an unpleasant appearance owing to this rocky ledge crossing it, over which the water ripples so much that a stranger would hardly think it safe to enter. The least depth found in that channel is 11 fathoms, but the tide sets so strongly over the narrow ledge that sounding upon it is not easy. Many vessels have entered at various times, and as no one has yet encountered danger it may be supposed that none exists, excepting within ½ mile of either head.

Anchorage.—The best anchorage in the bight eastward of the eastern head. Northerly winds send much sea into the southern bight. It is reported that a short heavy cross sea gets up with any strong wind, although the gulf is nearly landlocked. Fuel may be cut in the SW. part of the bay from stunted trees, but near the shore there is no appearance of fresh water. To the eye, all is barrenness and desolation.

Tides.—It is high water, full and change, within port San José at 10h. 15m. The tide rises from 20 to 30 feet, and the stream rushes between the heads from 3 to 5 miles an hour.

Tide races.—A vessel of 80 tons, bound from the rio Negro to port San José, was beset by one of these races when about 12 miles NE. of the entrance to that port. No bottom could be found with the lead; the sails were almost useless, notwithstanding a strong wind, owing to the violent motion of the vessel; some of the crew ran aloft to avoid being washed overboard; others ran below. After being the sport of the waves during two hours, carried with the tide, and unable to get clear, so much damage and inconvenience was caused, that getting out of the race, was followed by a change of purpose, and the immedate return of the vessel to the rio Negro without again attempting to enter port San José.

The races to the eastward of Norte point and Valdes creek are yet worse, but their height and violence vary as much as the winds and tides by which they are occasioned.

Norte point.—From the east side of port San José to Norte point, a distance of 28 miles, there is a continuous cliff from 60 to 100 feet in height. No high land appears inshore; all looks low, bare, and sunburnt. No dangers are known to exist, but to small vessels the races of tide met between San José and Norte point are troublesome, if not dangerous. Norte point is lower than the adjacent cliffs, and a reef extends off about a mile. In the offing is deep water.

Rocky patches.—From Norte point to Valdes creek, about 30 miles to the southward, the land is low, mostly a shingle beach. Off this piece of coast are the worst tide races, being occasioned by the rush of water across shoal and uneven ground lying from 2 to 10 miles off shore southeastward of Norte point, and the rocky patches lying 6 miles eastward of Bajos point. There are no marks on the land by which the shoals can be avoided. In a sailing vessel it is, at least, prudent to avoid going nearer to this shore than 15 or 20 miles. Sometimes the overfalls extend 15 miles from the land, at others they are hardly 5 miles distant, depending on wind and tide.

Valdes creek.—At 28 miles southward of Norte point is the entrance of this creek, which may be known by the shingle beach ending, the land to the northward being low, that to the southward high and cliffy; also by a line of cliffs commencing at Cantor point on the south side of the entrance, and continuing to the southward to Ercules point.

Ercules point, 8 miles southward of Valdes creek, is a white cliff 225 feet high. When first seen it appears perpendicular, or rather overhanging. Close to the northward of it are two perpendicular cliffs of the same height, off which a shoal ledge of tosca extends 2 miles to seaward and 3 miles along shore.

Valdes creek is a dangerously deceiving inlet of a singular character. The entrance is usually 70 yards in breadth, but sometimes it is entirely blocked up by shingle. The tides run most rapidly through the opening, and up the long narrow passage, which extends to the northward, at the rate of 4 to 6 miles an hour. A heavy surf breaks across the entrance when there is any swell

The depth of water on the bar is quite an uncertainty, depending upon the length of time that has elapsed since a SE. wind has heaped up shingle at the entrance. The strong tides scour out a channel as repeatedly as the gales block it up. It is an unfit place for any craft unless obliged to enter from some urgent cause.

In approaching it is absolutely necessary to keep well to the southward, to avoid the races, as far as Ercules point; and then run to the northward along shore. The creek should be entered with the flood tide and the wind off shore, by backing and filling, with the vessel's head to the southward. There is no room to wind inside, and when bringing up headway will be necessary to lessen the strain upon the cable.

Delgada point, the southeastern point of Valdes peninsula, is sloping and green and 200 feet in height. A tosca ledge extends to the southward and eastward a distance of 1½ miles.

Lobo peak, nearly 6 miles westward from Delgada point, rises only 15 or 20 feet above the table range. From the southward it appears double.

Nearly all the cliffy points between Valdes creek and Nuevo gulf have rocky ledges extending nearly a mile from high water mark. In some places they extend still farther, and should be allowed a berth of 2 miles.

Nuevo gulf is easily known by the two well-defined headlands, Nuevo head on the NE. and Ninfas point on the SW. side of the entrance. Nuevo head is 200 feet high, steep-to, and no danger exists off it excepting a few tosca ledges close to the shore.

Ninfas point, distance 7 miles SW. of Nuevo head, is 240 feet above the sea. It makes as a double point. Although bold to the eye it ought not to be approached nearer than 2½ or 3 miles.

Reef.—Rocks and tosca ledges extend east and east-southeastward of Ninfas point, and at the north side of the point there is a reef extending to the NE. nearly 2 miles. At 1½ miles from the shore the rocks dry at low water, with 7 fathoms close to. The tide rushes over them into Nuevo gulf at the rate of 5 or 6 miles an hour, causing, with a westerly wind, a heavy and dangerous rippling, the swell from which is felt entirely across the gulf, and is dangerous for small craft or open boats. In mid-channel there are no ripplings, and the tide is sufficiently strong to carry a vessel to windward, while hove-to in a fresh gale. When once well inside the head the tide is much less strong and the sea longer and more regular.

On the south side of the gulf there are several good anchorages off the shingle or sandy beaches between the different heads.

Cracker bay is the second bight westward of Ninfas point, between two white cliffs. Although bold looking these cliffs like the rest of the projections on the coast, have rocky ledges, which dry at low water, extending from them for the distance of 400 yards. These are the only dangers of approaching the bay.

A pole surmounted by a cask indicates the center of the bay.

Anchorage.—There is a good anchorage in 10 fathoms, mud, nearly midway between the east and west cliffs and at a distance of ½ mile from the beach. The holding ground is good and sheltered from the prevailing westerly winds, but an easterly wind would undoubtedly bring in a heavy swell.

The anchorage in Cracker bay is used in preference to that of port Madryn by vessels bringing cattle for the Welsh settlers at Chupat, as fresh water in small pools is found near the beach at the head of the bay.

Port Madryn, so named by the Welsh settlers of Chupat, is the westernmost bight in Nuevo gulf, and is surrounded by a range of table hills 300 feet high. Between the hills and the shore sandy hillocks 20 to 40 feet high and thinly covered with brushwood intervene. The beach in several places is formed at the base of white cliffs from 50 to 80 feet high.

Railway.—There is a railway to Chupat from port Madryn. A train runs about once a week from November to March and two or three times a week from March to October. The village near the railway station is named Trelew.

Telegraph.—There is telegraphic communication between port Madryn and Trelew.

Shoals.—A shoal with 2 to 3 fathoms water extends off Cave bluff, the eastern point, for a distance of ¾ mile in a NW. direction and one mile to the northeastward. At a distance of 1¼ miles in a NE. direction a depth of 5 fathoms is found and 11 fathoms at a distance of 1½ miles, but to the NW. of the cave the water deepens suddenly, the 10-fathom line being 1,200 yards off.

A shoal is situated about 3 miles eastward of port Madryn, and extending along the shore nearly 2 miles from East point (the point next eastward of Cave bluff), to the next point again to the eastward which has been named Shoal bluff. On this shoal a depth of 2¾ fathoms was obtained, with East point bearing S. 15° W. (south mag.), distant about one mile; depths of 4 and 5 fathoms being found on the apparent edge of the shoal ground to the eastward. The eastern part of the shoal ground was sounded over, the least water obtained being a depth of 3¼ fathoms, situated with East point bearing S. 80° W. (S. 65° W. mag.), distant about 1½ miles; from that position soundings of 4 to 7 fathoms were found for a distance of ½ mile eastward and northward.

From the appearance of all the points on the south shore of Nuevo gulf, it is probable that banks stretch off them; vessels should give that shore a wide berth until it is properly surveyed.

The reported position of the shoal (East point bearing N. 83° W. (S. 82° mag.) distant 6 miles) on which the *Gulf of St. Vincent* struck, was examined, but no indication of shoal water could be obtained; as, however, this examination was not very minute, the *Gulf of St. Vincent* shoal is retained on the charts for the present, although it seems probable that the bank on which that vessel struck is that found by the *Flamingo.*

Anchorage.—Port Madryn affords a good anchorage in 10 to 12 fathoms, mud, at about a mile from the shore, with Cave bluff bearing S. 35° E. (S. 50° E. mag.), distant a little more than a mile; or eastward of the bluff, abreast the landing. The latter is stated to be the better, by H. M. S. *Amethyst.*

Pier.—Vessels of 15 feet draft can lie alongside the pier at port Madryn at high water and discharge cargo into railway wagons.

Landing may be effected with on shore winds, at ½ mile eastward of Cave bluff, and on the western side just clear of the rocks. More to the westward of the cave, owing to the shelving of the shore, it is scarcely practicable except between half flood and half ebb. Landing may also be effected about ½ mile north of the pier.

Supplies.—Hares and partridges may be shot in the vicinity of port Madryn, but they are not numerous. Fish of good quality, particularly smelt, may be caught in large quantities either with the seine or with hook and line. Abundance of brushwood for fuel may be obtained.

There is no water to be obtained at port Madryn, nor is there any to be found on the road to the settlement of Chupat, a distance of over 40 miles; even the small quantity required by the man who was found in charge of the stores awaiting conveyance to Chupat had to be brought from thence. The water obtained from a well dug by the crew of H. M. S. *Volage* was brackish. Beef, mutton, eggs, etc., may be obtained from the Chupat colony, by giving notice, at fairly moderate prices.

Pyramid road.—The northern part of the gulf is fringed with steep cliffs. In the NE. corner there is a remarkable rock named the Pyramid, which forms the western point of Pyramid road. The road is sheltered, having good anchorage, except with southerly winds. The best berth is with the Pyramid bearing N. 75° W. (west mag.). No tide is felt here. In ordinary weather landing may be effected in a small cove in the NW. corner. There are three fresh water lagoons about 6 miles north of Pyramid road, but they are dry in summer.

Tides.—It is high water, full and change, in Nuevo gulf at 7h. 15m., springs rise 13½ feet, neaps rise 10 feet.

Engaño bay.—Chupat river.—From Ninfas point the coast trends in a southwesterly direction for a distance of 40 miles, to the entrance of Chupat river, in the SW. corner of Engaño bay. This shore is cliffy, similar to the coast eastward of Nuevo gulf, and with no outlying dangers. In Engaño bay the water is shoaler than that near the higher land. Around the bay, between the North and South cliffs, the land is low and sandy, with many sand hummocks near the beach. Southward of the river is a range of tableland, from 50 to 60 feet in height, ending in white, chalky-looking cliffs. Castro point is the NE. termination of the tableland.

Bar.—The entrance to the Chupat is just where the sand hummocks end (on one of which is a beacon), and the cliffy shore again begins. The entrance is partly concealed by a ledge of rocks which crosses it, and, at low water, quite hides it from view. Between this ledge, which uncovers at half tide, and the beach is a shifting bar with scarcely a foot of water on it when the tide is out, but at high water there are from 7 to 12 feet, according to the state of the tide. Within the reef the water is at all times quite smooth. Near the mouth the river is not more than 60 yards wide, and is 5 feet deep at low water; higher up it gets broader, but not deeper. At low tide the water is quite fresh at the bar.

Vessels exceeding 8 feet draft use port Madryn, which is often the readiest way of communication with the colony, as the Chupat bar is sometimes impracticable for a whole week.

Beacon.—A beacon is erected on the round sandhill, north of the river, which assists in identifying the entrance.

Pilot.—Small craft wishing to enter the river may obtain the services of a pilot by sending into the river for him, who, with the Argentine Government harbor master, resides 2 miles above the bar, within sight of the anchorage.

Anchorage, under very favorable circumstances, may be obtained off the river, in 5½ fathoms, but altogether exposed.

H. M. S. *Amethyst* anchored in 7 fathoms, pebbly bottom, about 2½ miles off shore, with Castro point, bearing S. 33° W. (S. 18° W. mag.), the beacon N. 88° W. (S. 77° W. mag.), and the wreck of the schooner N. 55° W. (N. 70° W. mag.). It is said that the anchor sinks into clay beneath the pebbles, requiring that it should be lifted at least every three days, or it is not likely to be recovered.

Welsh colony.—It was at port Madryn that the original settlers, chiefly from Wales, now established at Chupat (sometimes called Chubut), landed in 1865. The settlers in 1891 numbered about 2,700 people. Their farms are scattered along the banks of the river Chupat for a distance of 23 miles from the sea. There is a village near the mouth of the river, and a village named Caimen about 20 miles from the mouth. The prosperity of the colony is increasing, and their flocks and herds are rendered safe from drought by the supply of water from the river by means of an artificial canal 20 miles long, fitted with sluices. The settlers are on friendly terms with the Indians, who bring horses, ostrich feathers, the skins of the guanaco and other animals to barter for groceries, spirits, and tobacco.

The exports consist of wheat, butter, ostrich feathers, and skins of animals obtained from the Indians.

The climate is dry and said to be very healthy. Fogs and mists are unknown. Rain seldom falls in large quantities, and there is little or no dew.

Tides.—It is high water, full and change, at the entrance of Chupat river at 5h. 30m., and the rise is from 6 to 12 feet. The ebb in the river runs from 2 to 4 miles an hour; the flood is not felt more than 6 miles up the river.

Off the entrance the flood runs northeastward and the ebb southwestward, nearly in the direction of the shore, and from one to 2 miles an hour.

Directions.—Small craft wishing to enter the Chupat should avail themselves of the services of a pilot, who buoys the entrance from time to time as the bar shifts. Boats or flatbottomed barges might be tracked up by men or horses to a great distance. The river is free from obstacles, and the banks are firm and level. The best time to leave the river is before high water, with the last quarter flood, because, when the ebb makes, it sets directly upon the reef.

Coast.—The coast from Delfin point, 12 miles SW. of Chupat river, to Lobos head and Union point is high and bold, the water being deep and free from danger. The cliffs have a chalky appearance, and consist of a light-colored sand and clayey earth, with dark horizontal strata.

At Delfin point, 270 feet high, a small conical hummock is seen above the tableland, which appears double, saddle-shaped, and rugged when seen from the northward. Ten miles south of Delfin point is Hidden islet, and so much like the cliffs near that one might easily run past without seeing it. Union point, 13 miles farther to the southward, is rather low and rocky. Here the character of the coast changes, bold cliffs and extensive ranges of tableland no longer meet the eye, the shore becoming lower and more uneven.

Tombo point, 13 miles to the southward of Union point, is low. There are rocks off the point, and a ledge extends ½ mile to the northeastward. A depth of 7 fathoms was found at 200 yards from the shore, but the water appeared to be shoaler farther off. On the north side of the point, inside the reef, there is an anchorage where small craft might find shelter from SE. winds. Sealing vessels anchor there at times.

Atlas point, 6 miles south of Tombo point, forms the northern head of Vera bay. It is 70 feet high, and shows a smooth slope, terminating in a low rocky point when seen from the northward or southward, but in a rugged ridge of rocks if seen from the eastward. A ledge of rocks under water extend off nearly 400 yards from the point.

Inland, between Atlas and Tombo points, is mount Triste, 300 feet above the sea.

Vera bay.—At one mile SW. of Atlas point is an anchorage for small craft, drawing less than 12 feet. It is formed by a reef of rocks, lying SW. and NE., nearly a mile in length, and 100 yards broad. A vessel may enter from the NE. or from the SW., remembering that in each entrance there is only a depth of 12 feet at low water, with a rocky and uneven bottom. Inside, opposite the shingle beach, is a good berth, in 15 feet at low water, over a bottom of coarse sand, shell, and sandy mud.

With a strong wind from the southeastward a sea may be thrown into this corner, over and around the natural breakwater, from the beginning of the last quarter flood to the end of the first quarter ebb, during which time the reef is covered; the beach, however, does not show the effects of much sea. The tide sets through between the reef and the shore, about a mile an hour. The land is low close around the bay, but rather high ground is seen inshore.

Two islets, with rocks near them, lie near the middle of Vera bay, about 6 miles south of Atlas point.

Raso cove.—Cape Raso, the southern point of Vera bay, is level and rather low, and there are a few rocks close to its extreme point. At 2 miles NW. of the cape is Raso cove, a good anchorage with all winds, excepting those between N. by W. and NE. This cove is free from danger; but on the east side the ground is hard and stony; in the middle, and near the west side, there is good holding ground, a stiff yellow clay. Sand is shown by the handlead, but underneath is clay. There is neither fresh water nor any firewood, except a few straggling bushes.

Salaberria reef.—In approaching this part of the coast from the northward, there are several rocks near the shore very little above water, and there is a considerable reef in the offing named Salaberria, the NE. extreme of which is a dry rock 4½ miles S. 64° E. (S. 79° E. mag.) of cape Raso, and N. 55° E. (N. 40° E. mag.), 8 miles from cape San José. This ridge probably projects off from cape San José, for there are two dry rocks in the same line of bearing; one at 1½ miles and the other at 3½ miles from that cape, besides several patches which break. The tide sets rather strongly along the shore, which is fronted by reefs for 2 or 3 miles off. Great caution should therefore be used in approaching the coast, as the water is deep, and, if becalmed, it may be necessary to anchor in 30 fathoms water.

Cruz bay.—Should Salaberria reef be as continuous as it appears, there ought to be good riding in Cruz bay, between cape Raso and cape San José. New cove, also called Santa Cruz bay, close to the northward of cape San José, is small and exposed to east winds. West cove, in the SW. corner of Cruz bay, has not been examined.

Port Santa Elena lies about 3 miles westward of cape San José, and its approach may be easily known by the remarkable hummocky hills on that cape.

Florida reef, which covers at three quarters flood, is about 200 yards in extent, and lies about ¾ mile N. 86° W. (S. 79° W. mag.) of Acertada islet. At ¼ mile westward of the reef is a bank with only 12 feet water; both of these must be avoided in working into the port.

Cleopatra rock has a depth over it of about 2 fathoms at low water, and is situated with the summit of the peninsula of St. Elena, bearing about N. 7° W. (N. 22° W. mag.), distant 800 yards, and Acertada islet S. 72° E. (S. 87° E. mag.). The position of this rock is doubtful, and vessels approaching the anchorage at the port of St. Elena should exercise caution.

Anchorage.—The best anchorage is at the NW. corner of the port, in 6 or 7 fathoms, but not too near the shore, for when the sea is heavy the ground swell breaks for some distance off.

Two rocks about awash at low water are reported to lie 100 yards off the beach westward of St. Elena peninsula.

The anchorage looks dangerous in southerly winds; a very uncomfortable swell sets in with the wind from south to SSE., force 2 to 3.

Supplies.—The water that is contained in the wells on the western shore of the port is too brackish to be worth consideration; nor is there any fresh water to be obtained from any part of the harbor. Of fuel, a temporary supply may be procured from a small shrubby tree, which is tolerably abundant here. Guanacos, ostriches, armadillos, and the cavia or Patagonian hare are to be procured, as are also wild ducks, partridges, snipe, and rail, but fish seem to be scarce. The guanaco affords an excellent food, but it is a difficult animal to approach; one that was shot when cleaned and skinned weighed 168 pounds. The Indians sometimes visit this part of the coast, but principally for the purpose of burying their dead.

Tides.—It is high water, full and change, at port Santa Elena at 4h., springs rise 17 feet.

Camerones bay lies between the south head of port Santa Elena and cape Dos Bahias, a distance of 22 miles, and in it the coast forms two bights, the southernmost of which is considerable, and may probably afford good anchorage. The shore of the bay is rocky as far as

Fabian point, where it changes to shingle, and so continues as far as the cape. Along this shore, and especially at the headland, the tide runs from one to 3 miles an hour, nearly NNE. and SSW., rising from 8 to 12, and sometimes even to 15 feet.

In the depth of Camerones bay there is a high, rocky islet with two lower and smaller ones to the east and north, all of which are whitened by birds, and so named Blanca islets.

Cape Dos Bahias is a rounded point, with a hill close to the sea, on its most projecting part. A ledge of rocks extends about one mile NE. from the cape. Moreno islet, 2 miles NW. of the cape, 600 yards from the shore, is high, rocky, and of a dark color.

Gregorio bay, about 6½ miles to the southward of cape Dos Bahias, and just northward of Leones isle, is exposed to SE. winds, and somewhat difficult to enter, because of the strong tides setting past it. There is, however, good shelter from the prevailing winds.

Islets.—Between cape Dos Bahias and Gregorio bay is Sola island, about 90 feet high, and the Aguilones islands about ½ mile off shore; in the offing, about 4 miles off shore, is Arce island, about 90 feet high. The islets have deep water near them and are, therefore, not dangerous.

Rasa islet, bearing S. 26° E. (S. 41° E. mag.), distant 11 miles from Dos Bahias cape, is a flat topped gray rock, almost awash at high water; it lies in a NNW. and SSE. direction, and is divided into two nearly equal parts by a narrow channel.

Landing on Rasa islet, even when the sea is smooth, is difficult to effect, as the base of the cliff forming the coast line is much worn by the action of the sea, and overhangs. It is much frequented by seal hunters, and during the season many sea lions are captured.

A reef extends ⅜ mile southward of the islet; this same reef is stated by Fitzroy to extend one mile off. At night and during thick weather the islet should be approached with great caution.

Gulf of St. George.—Leones isle, lies off the NE. point of the gulf of St. George, and 7 miles S. by W. of cape Dos Bahias. It is 280 feet high, 2 miles long east and west, 1½ miles broad, and covered with brushwood; on the summit stands a stone pyramid which forms a good landmark. A reef on which the sea always breaks, extends nearly ½ mile from Lanaud peninsula, the SE. extremity of Leones isle; the isthmus between this isle and peninsula is covered at half tide.

English bay, situated on the northern shore of Leones isle is 300 yards deep and 200 yards wide with from 3 to 4 fathoms water.

French bay, on the SW. shore of Leones isle, is protected from the westward by Ship isle, and from the southward by Southwest isle which is low, rocky, and connected with Leones isle by a ridge which dries at half ebb.

Ship (Harbor) isle is low and rocky, with shoal water extending some distance from its NW. point; at 400 yards west of the western extreme of this isle lies a dangerous rock, on which the sea generally breaks.

Anchorage.—The northern entrance to this bay, between the NW. point of Ship isle and the west extreme of Leones isle, is about 400 yards wide with 12 fathoms water; the southern entrance, in which there is generally a heavy swell, also the southern part of the bay, is very shallow. The anchorage is in 6 to 8 fathoms good holding ground on the north side of Ship isle and nearly abreast the French establishment on the Leones shore, with shoaler water farther southward. Oil and guano are exported.

There is good landing on a gravel beach at the head of a small creek near the establishment.

Directions.—In approaching this anchorage the set of the tide should be considered, in order to determine whether to pass round the north or round the south side of Leones isle. The flood tide runs strongly to the eastward round the northern side, between it and the mainland.

The tide sets directly through the anchorage, causing eddies which will turn a ship round at her moorings against a strong breeze; this and the strength of the tide setting between the isles and the main are some objections to anchoring here.

Leones channel.—St. Roque point, about one mile west of Leones isle, on the main, is low and rocky, with a hummock upon it. A rock named Black head, covered at high water, lies SW. of the point, about 200 yards distant. While the flood tide is running a vessel ought to give it a good berth, as the tide sets rather toward it, or to the northeastward, from 3 to 5 miles an hour. There is no other danger in the passage between Leones and the main.

Passage bay, one mile NE. of St. Roque point, affords good landing.

The tides set to the eastward during the flood, crossing Passage bay at the rate of 3 miles an hour and causing much rippling.

St. Roque bay.—From St. Roque point the coast trends NW. ¾ mile to St. Roque bay, which is nearly ½ mile deep and 400 yards wide at its entrance. Anchorage can not be recommended in this bay, as the depths are irregular and a heavy swell occasionally sets in.

St. Antonio peninsula, 295 feet high, at 1¾ miles westward of St. Roque point, is joined to the mainland by an isthmus composed of gravel, 650 yards long, and 140 yards broad. A rock dry at low water and steep, lies near the west side of Cabo del Sur (South cape) the south extreme of St. Antonio peninsula.

Gill bay, which is formed by St. Antonio peninsula and the north shore, is about one mile deep and ¾ mile wide; in the middle of the bay lies Basin bank (Half tide island), rocky, ¼ mile long east and west, and covered at high water; there are depths of 4 to 5 fathoms close around, and 3½ fathoms at 400 yards SE. of this bank.

The Oven, an inlet at the head of Gill bay, extends ½ mile in a northerly direction and terminates in a lagoon, part of which dries at half tide; the entrance to the Oven is nearly 200 yards wide with 4 fathoms water, decreasing to 12 feet at ½ mile within; the cliffs rise perpendicularly on both sides to a height of 160 and 190 feet. The lagoon abounds with shell fish.

A well of fresh water is situated in the northern ravine on the east side of the Oven, and afforded excellent drinking water during the stay of Capt. J. B. Olry, of the French navy, 1876.

The best anchorage in Gill bay is in 8 fathoms, at 600 yards NW. of Basin bank.

Southerly gales send a heavy swell into Gill bay, as well as into Egg harbor.

Egg harbor (Port San Antonio) between San Antonio peninsula and Valdes island, 230 feet high, is sheltered from all winds except those from SE. It is one of the best ports on the coast, and small vessels in entering may pass on either side of Valdes island, and steer by the eye, as there is no hidden danger. Southerly winds send in a good deal of swell, but cause no further inconvenience. The southern entrance to this harbor is 600 yards wide with general depths of 8 and 9 fathoms; at 300 yards from the east extreme of Valdes island there is a depth of 4¾ fathoms with 6 to 7 fathoms close around. The northern entrance is 450 yards wide, with 9 to 18 feet water.

The best anchorage in Egg harbor is in about 6 fathoms, gravel over clay, with north extreme of Valdes island in line with south extreme of Cayetano islands bearing N. 64° W. (west mag.); small vessels may anchor near Valdes island.

Excellent fish may be caught in this harbor, and rabbits on Valdes island.

Tides.—It is high water, full and change, in Egg harbor, at 4h. 0m.; springs rise 17 feet. The flood tide sets through the harbor from west to east at about 1½ knots an hour; the ebb is scarcely felt.

Los Frayles.—At 1¼ miles westward of Valdes island lie Los Frayles, consisting of three rocks nearly awash at high water, with deep water close around. At one mile N. 33° E. (N. 17° E. mag.) of Los Frayles is a rock of 4½ fathoms.

Cayetano bay, situated 2 miles westward of Egg harbor, is partially sheltered from southerly winds by the Cayetano islands, which extend mearly a mile in a NE. by E. and SW. by W. direction. The southern entrance, between the easternmost of these islands and Guanacos point, is ½ mile wide, with depths of 8 to 11 fathoms; the northern entrance is about a mile wide with 12 to 18 feet water.

Temporary anchorage.—Small vessels may obtain temporary anchorage in 4 to 5 fathoms, gravel, with the east extreme of the largest Cayetano island bearing S. 16° W. (south mag.), distant about 400 yards.

Water.—Moderately good drinking water may be obtained by digging in the gravel some distance from the beach in a valley on the NE. side of Cayetano bay.

Arredondo bay, the entrance to which lies 2 miles westward of Cayetano bay, affords shelter for small vessels; there is generally a swell setting into this bay, but the holding ground is good.

Pan de Azucar.—This island, lying nearly 2½ miles westward from Los Frayles, does not resemble a sugarloaf; its summit is uneven and rocky, and 176 feet above the sea. There are rocks and reefs close around and dangerous ones between it and San Pasqual (Molino) reef, Castillos point, and port Melo. This portion, of which little is known, must be avoided.

Port Melo.—About 2 miles west of Arredondo bay, the coast recedes and forms a bay 2½ miles deep and 3 miles wide, having in it two groups of islets, the southern named Escobar and the northern Laguna; between these islets and the eastern shore of this bay lies port Melo, the north and NW. parts of which dry at half tide.

Anchorage may be otained in port Melo in about 4 fathoms water, with Portugal point, the east entrance point of the port, bearing S. 42° E. (S. 68° E. mag.); the best position is in 5 fathoms, sand, with Portugal point bearing S. 7° E. (S. 23° E. mag.).

It is very rocky, and too much exposed to southerly winds to be valuable as a port.

Tides.—It is high water, full and change, at port Melo at 3h. 40m.; springs rise 15 feet. The tides off this part of the coast are strong, running along the land at the rate of 2 or 3 miles an hour. Off the projecting points and in confined passages their strength is, of course, increased, and causes heavy ripplings when opposed to the wind.

Castillos point (**West point**) 4 miles west of port Melo, is fringed by rocks, some of which extend more than 200 yards from the shore; ¾ mile southeastward are the Cangrejos rocks, and on the SW. side of Castillos point there are several islets and rocks, the principal of which are Long islet, Flat islet, and White rock; landing may be effected on the mainland abreast Flat islet.

Between Castillos point and cape Aristazabal, a distance of 25 miles to the westward, are several bights and coves, though none of them are worth notice as fit places for anything larger than a decked boat.

Tova island, 6 miles SW. of port Melo, is 4 miles long in a SE. by E. and NW. by W. direction; it is divided at high water into four parts, the westernmost and largest, 128 feet high, is covered with vegetation; the easternmost is low and rocky, terminating in East islet. At ¾ mile to the eastward of East islet lies a dangerous reef covered at high water; in the channel between there are depths of 8 to 12 fathoms. There are several rocks above and below water extending about a mile from the SW. shore of Tova island, the principal of which is Goëland rock, situated a little over one mile from the west extreme of the island.

Supplies.—Rabbits are found on Tova island, and quantities of fish may be caught with the seine in the channel between the islands. Shellfish are also plentiful, but cause colic. Water may generally be obtained at Watering point, where there are rocky pools in which rain water accumulates. From September to April the island is covered with penguins, and in the valleys there are quantities of guano. At Castillos point, on the main. partridges, hares, and guanacos may be shot.

Penguin rock, covered at high water, lies ¼ mile northward of East point, the NE. extreme of Tova island.

Anchorage bay, situated 1½ miles west of East point, affords a well-sheltered anchorage in 4½ to 5 fathoms, gravel over clay, with the center of Gull islet bearing N. 84° E. (N. 68° E. mag.), distant 700 yards. Gull islet, which has a stone pyramid on its northern part, is connected with Tova island at low water. The heaviest squalls are from SW. A strong tide is always setting through between the island and the main.

Northwest bay, at one mile west of Anchorage bay, affords good anchorage in 7 fathoms, gravel and clay, with the pyramid and beacon on the western shore in line, and a short distance east of the line of the two beacons on the southern shore. These leading marks on south shore, when in line, appear to lead very close to the westward of Sea Lion rock.

Sea Lion rock, which covers at high water, with 8 to 12 fathoms close around, lies ¾ mile NNE. of North point, the NW. extremity of Tova island. It always breaks.

Medrano rocks and Robledo islets.—Medrano rocks are a dangerous cluster of rocks, awash at low water, lying 2 miles S. 18° E. (S, 34° E. mag.) of the east extreme of Tova island. The sea breaks upon it with violence at most times.

At 5½ miles N. 80° W. (S. 84° W. mag.) of these rocks, and 2¼ miles from the SW. side of Tova island, lies Great Robledo, consisting of three islets about ½ mile in extent. Little Robledo lies 1½ miles N. 63° W. (N. 79° W. mag.) of Great Robledo, with 11 to 23 fathoms, rock, between.

Tides.—It is high water, full and change, in Anchorage bay, Tova island, at 3h. 45m.; springs rise 18 feet.

NOTE.—From a recent survey, the coast of the peninsula and the islets from Raza to Tova are 2½ minutes too far east.

Lobos and Galiona isles, lying inshore, to the westward of Tova, are beset with rocks. Inside these islands is Bustamante bay, open and exposed to SE winds; several rocks lie near the middle. The Viana isles lie 4 miles eastward of port Malaspina, and 1½ miles eastward of the largest is a reef on which the sea generally breaks; in other directions they may be approached with safety.

Port Malaspina, separated from Bustamante bay by Gravina peninsula, is a mere rocky inlet, unfit for anything except a boat. Upon this coast a southerly gale drives a heavy sea. The land has everywhere a barren, desert appearance, destitute of verdure. In height it is generally between 100 to 700 feet, Pineda paps, about 10 miles inland, being 660 feet high.

Cape Aristazabal, about 2½ miles southward of port Malaspina, has deep water close-to, excepting at ⅜ mile to the SE., where there is a reef which causes breakers at half tide. Off the cape the flood tide sets to the northeastward about 2 miles an hour; the ebb runs to the southward.

Caution.—The steamer *Brenda* (1893) foundered on a sunken rock reported as lying about 1½ miles S. 74° E. (east mag.) of cape Aristazabal, and as no detailed examination has been made of the vicinity mariners are cautioned to give it a wide berth.

Coast.—From cape Aristazabal to Cordova cove, a distance of 46 miles to the SW., the land gradually rises. A range of tableland is seen, increasing in height as it extends southward. There is a rock off the Quintano isles, which lie 7½ miles westward of the cape. The soundings are regular, the tides scarcely felt, the coast steep-to and bold. Southward of Quintano isles high light colored cliffs fringe the shore, and continue as far as Cordova cove.

Salamanca peak, situated about 11 miles northward of Cordova cove, is a regular shaped cone, about 700 feet high, which shows distinctly above the high ranges of tableland, and is visible in clear weather from a distance of 30 miles.

Cordova cove is rocky and shallow, and almost unfit for any vessel. A reef extends ½ mile eastward and southward from the northern point of the cove; and 2 miles northeastward of the point lies Novales shoal, a small rocky ledge under water. At 5 miles southward of the cove, and one mile off shore, are the Ali rocks, covered at high water, but will be seen by the breakers. There is no other known outlying danger between Cordova cove and cape Three Points, the southern point of the gulf of St. George.

Tilli road, 14 miles to the SW. of Cordova cove, lies northward of Marques point, and is tolerably good anchorage during westerly winds. The beach is level and sandy, but so much swell generally breaks upon it that landing is difficult. There is plenty of small firewood near the shore, and a salt pan of fine white salt. The position of the roadstead may be recognized by its lying between the second and third prominent bluffs which are seen to the southward of the lower land about Cordova cove. From north, through east to south, the road is open. The anchorage is in 5 or 6 fathoms water, over a clean sandy bottom.

Coast.—In the depth of the gulf of St. George from Tilli road to a cliffy bluff named cape Murphy, a distance of 35 miles, the shore is low, generally a shingle or sandy beach, without cliffs or rocks. The soundings in the offing are regular. Thence for 28 miles to Casamayor point the shore is rugged and broken. Very little cliff is seen until Casamayor point is reached, where the land again rises into a high ridge, named Espinosa heights, fronted by precipitous cliffs. Thence to cape Three Points the coast for 48 miles is cliff. rock, sand, or shingle, in disconnected portions.

Cape Three Points (Tres Puntas) may be known from seaward by observing that it is the termination of a long range of tableland trending north and south. A short distance southeastward of the northern end of that range is a remarkable conical hill, 250 feet high, like a sugarloaf, attached to the main range, though rather a straggler; and there is a small sharp peak rather northward of the fall of the range. The cape shows three distinct upright heads of a light colored earthy cliff; off these heads are ledges of rocks, extending ½ mile to seaward, and over them the tide rushes and ripples with violence. One mile from the shore there is no danger.

From cape Three points to cape Blanco, a distance of 8 miles to the SE., the coast is low, rocky, and fringed with kelp, with tableland inshore. Salt lagoons extend for many miles inshore of these points.

Cape Blanco, at a distance, makes as an island. Three distinct masses of rugged rock, about 130 feet high, are connected to the mainland by a narrow, low isthmus. On each side of the isthmus is a small cove. That on the south side is sheltered, excepting from south to east. A very small vessel might obtain tolerable shelter from all winds by anchoring close to the end of the kelp, in the NE. corner of the cove.

A vessel intending to anchor here should make great allowance for the tide. The flood sets with force over the bed of rocks which lie ½ mile northeastward of the cape, and they would prove extremely dangerous if drawn among them. The beach around the cove is rather steep and formed of shingle, here and there mixed with dark sand. The depth is from 4 to 6 fathoms. Plenty of firewood may be cut on the SW. side of the cove, a few yards from the beach, but there is no appearance of fresh water.

Byron shoal.—Between capes Three points and Blanco is Byron shoal, about 6 miles in extent in a NNW. and SSE. direction, and about ¼ mile wide. Over this shoal there is little water in many places, the soundings are irregular, and the locality should be avoided. Ripplings and overfalls more or less violent, according to the time of tide and direction of the wind, point out the position of the bank. The north end of the bank is 7 miles S. 85° E. (N. 79° E. mag.) of cape Three Points, and its southern end east (N. 74° E. mag.) 5 miles from cape Blanco.

The north end of Anne shoal bears S. 77° E. (N. 87° E. mag.) 7 miles from cape Blanco, and extends in nearly a southerly direction for 2 miles. Between these shoals there is a passage 2 miles wide, and the depth gradually increases to more than 15 fathoms.

Within these shoals are two others; a small one with 2 fathoms on it, bearing S. 54° E. (S. 70° E. mag.), distant 2¼ miles from cape Blanco, and another 2 fathoms bank, which has been named after the cutter *Susannah*. It is 2½ miles long, in a NNE. and SSW. direction, and nearly a mile broad, and its northern end lies 3½ miles S. 52° E. (S. 68° E. mag.) from cape Blanco.

There is probably more shoal ground to the northeastward, as, with cape Three Points bearing S. 72° W. (S. 56° W. mag.), the depth rather suddenly decreases from 40 to 14 fathoms, pebbly bottom, about 10 miles within the 50 fathoms' edge of the bank. On approaching the land the quality of the bottom becomes irregular, and changing from ooze to sand, with pebbly shoal patches, so that by attention to the soundings and nature of the bottom these shoals may be avoided.

A good mark to avoid these shoals is not to approach so near to the cape as to see the rugged hillock of cape Blanco, and to keep the high land of cape Three Points, which is visible from the deck about 20 miles, on the horizon.

Tides.—At full and change, the flood or northerly tide ceases in the offing about 4h. 15m., but near cape Blanco and among the shoals the tides may be less regular; they produce strong ripplings, and set from 3 to 4 miles an hour round cape Three Points.

Coast—**Rivers peak**, about 20 miles south of cape Blanco, is isolated, and when bearing N. 74° W. (west mag.) shows northward of a table-topped range SE. of it, which latter has a fine steep bluff at its southern end. Rivers peak may be seen from a distance of 20 miles in clear weather. The coast line between cape Blanco and port Desire is low and imperfectly known; within the distance of 3 to 5 miles from the shore there are several patches of rock, which uncover at half tide, but beyond that distance the coast is free from any known danger, and may be approached to not less than 15 fathoms; within that limit the ground is foul. Within 3 miles of port Desire the land becomes high and cliffy.

Port Desire, at the mouth of the river of the same name, has rather a difficult entrance, from the strength of the tide and its narrow breadth, and it is rendered still more confined from several reefs that extend off the north shore or that lie nearly in mid-channel. The north point of entrance is a steep bluff, and is, therefore, remarkable as being the only point of that description along this part of the coast. Direction hills, 420 feet high, are situated about 4 miles to the northwestward and show out well and are easily recognized at some distance.

Sorrell ledge.—At 4 miles N. 39° E. (N. 23° E. mag.) of Seal island, eastward of the bluff, is Sorrell ledge, ¼ mile seaward of which the depth is 13 fathoms. Tower rock, 1½ miles within the entrance, on the south side of the port, is very conspicuous and becomes visible soon after passing this ledge; it opens out when the north bluff bears about S. 61° W. (S. 45° W. mag.).

Seal island.—This rocky islet, at the NE. point of the entrance, colored white by guano, shows well against the dark-colored bluff behind it when seen from the northward. At low water black rocks extend from Seal island in a southeasterly direction; this is also the best time to enter, when many of the rocks are uncovered.

Chaffers ledge, on the south side of entrance, can usually be distinguished by the breakers upon it. The tidal streams run at the rate of 5 to 6 knots, underrunning the kelp, but at low tide the kelp shows near the ledge and may be passed close-to.

Beagle rock, near the center of the channel, is very dangerous, giving no indication of its existence. All other dangers show by the breakers upon them.

Shingle point.—Beacons.—Two pole beacons have been placed upon Shingle point to serve as a leading mark between Chaffers ledge and Beagle rock. The inner beacon is surmounted by a ball; the outer one has a ball one-fourth from the top. These beacons are small and can not be easily distinguished beyond a distance of 2 miles.

Settlement.—The failure of the water supply has necessitated the removal of the settlement (consisting of a few wooden huts and a party of 13 men, commanded by a naval officer) to the south shore. Shipwrecked crews are assisted here by authority of the Argentine Government. The Argentine flag is hoisted when a vessel is sighted; this flag can be seen when Tower rock opens. The ruins of the old Spanish settlement, established in 1829, were in 1883 in a good state of preservation, and are in possession of the present settlers; cabbages, parsley, cherries, and quinces remain in the gardens planted by the early Spanish settlers.

The inlet was examined, as far as a boat could go, by H.M.S. *Beagle*, and from a neighboring hill it appeared at that time to be fed by a very small winding stream; but from the broad level ground and muddy flats on either side of the stream, and the steep cliffs which bounded them, it appears probable that they form the bed of a large river at certain periods of the year.

Supplies.—At 4 miles above the ruins there is a small peninsula, connected by a narrow isthmus to the north shore. By sending a party up, and stationing men with guns on the isthmus, it is very likely that several guanacos may be shot as they are driven across it, for the peninsula is their favorite feeding place. These animals are abundant, but unless stratagem be used they are very difficult, from their shyness, to be approached. The easiest way of shooting them is by lying in wait, at break of day, near the places where there is fresh water. Guinea pigs are also numerous, and excellent eating; partridges and hares may also be shot.

There are some holes near the ruins which generally contain water, but of so brackish a quality as scarcely to be worth notice. On the islets up the inlet, and in many of the valleys, firewood of a superior quality may be obtained. The country appears to be a parched barren desert, with some tufts of brown grass and a few stunted bushes. Of edible vegetables there are few or none; good wild fowl are plentiful, and fish, especially shellfish, are abundant.

Indians.—The Indians in the neighborhood of port Desire, who formerly were hostile, are now said to be friendly, and come into the settlement for purposes of trade.

Pilots.—A small cutter is stationed at port Desire by the Argentine Government as a revenue and protection vessel in charge of the man who is the pilot of the port, and who will come off on the usual signal being made.

Anchorage.—A good position is with Tower rock bearing S. 18° E. (S. 34° E. mag.), and shingle point S. 80° E. (N. 84° E. mag.), or more easterly as the vessel's draft will admit. There is anchorage for large vessels as far as 6 miles up the inlet.

Temporary anchorage will be found in 7 fathoms, well sheltered from westerly winds, with North bluff bearing N. 35° W. (N. 51° W. mag.), and Tower rock N. 82° W. (S. 82° W. mag.). This position being a little to the southward of the fairway of the port, and about 1½ miles from the nearest shore, is out of the strength of the tide. The bottom is strewed with rounded stones, but the holding ground, although of such supicious quality, seemed to be good.

Tides.—It is high water, full and change, at port Desire at 0h. 10m., springs rise 18½ feet. The tides set in and out of the port with regularity, and at the rate of 5 knots an hour. The interval of slack water is short. It should be borne in mind, when approaching any part of the coast between Union bay and port Desire, that there is a difference of half a tide, or 3 hours nearly, between the turn of the tide stream in the offing and the time of high water in the harbors. The flood or northerly stream in the offing runs from three hours before high water by the shore, until three hours after high water; the ebb the reverse way.

Directions.—By waiting for low water, all the dangers that exist will be seen, and a sailing vessel may be dropped in with the tide should the wind be, as it generally is, westerly. If it be fair it will be advisable for the vessel to be in the entrance at slack ebb, or a little before; as the water is deep on the south shore, there seems to be no real danger that may not be avoided by a careful lookout for kelp, which on that coast always grows upon, and therefore plainly indicates the existence of rocky ground. It must be remembered that the chart is old and little more than a sketch.

When approaching from the northward, vessels should give Seal island a berth of not less than one mile, steering for the white cliffs in the bight southward of Chaffers point; and when the triangular patch on the distant hills is in line with Shingle point bearing N. 80° W. (S. 84° W. mag.) steer for them on that bearing, until the beacons on Shingle point are seen; keeping them in line bearing N. 78° W. (S. 86° W. mag.) leads between Chaffers ledge and Beagle rock in not less than 5½ fathoms at low water.

When Seal island bears N. 53° E. (N. 37° E. mag.), the vessel will be abreast of Beagle rock and past Chaffers ledge, borrow towards the south shore which is steep-to, but between Shingle point and the settlement shore, where the stream is very strong, it is recommended to keep in mid-channel. When past Shingle point, sheer over to the north shore out of the strength of the tide, and anchor off the ruins of the old settlement.

Sea Bear bay.—Penguin island, situated off the NE. point of Sea Bear bay, is 11 miles SE. of port Desire. It is about 150 feet high, is bold on the eastern side, and may be passed close to, for the tide rather sets off than towards the shore. There are a few huts on the island, apparently deserted, though probably used in the sealing season. SW. of this island is Sea Bear bay, one of the best anchorages on the coast, but difficult of access, without a leading fresh wind, on account of the spring tides, which set through the narrow channels between Penguin and the coast; and though an anchor might save a vessel from driving ashore, the bottom is very foul, and she would not be likely to recover it.

In entering the bay, border pretty close to Wells point, the low rocky south point of entrance, in order to avoid May reef, which lies about ¼ mile north of the point; but as the reef always breaks, the eye and a due consideration of the tides are the best guides. The reef extends for some distance eastward of the breakers. Within the reef the tide sets in or out of the bay, but with little strength. There are depths of 12 or 13 fathoms off the reef; then the water shoals for one or two casts of the lead, to 7 fathoms, after which it deepens again. The vessel may then haul across the bay, and anchor in 4 fathoms, with Wells point bearing S. 74° E. (east mag.) distant about ¼ mile; avoiding the kelp which projects from the sandy beaches. For further directions the plan will be the best guide. When once in, the anchorage is good and protected at all points, except between NE. and E. by N., but from the appearances of the beaches it is not probable that a heavy sea is often thrown in.

Should a vessel not be able to enter the bay, there is anchorage off Wells point between it and the reef, on (it is said) tolerably clean ground.

Supplies.—There is no wood of any size to be procured in Sea Bear bay, and the few gallons of water that may be collected in the wells, situated immediately within Wells point, are too precarious to be worth attention. The passage to these wells is over a small rocky bar, which a boat may cross at three-quarters flood. There is a small spring at the north end of the third sandy beach, which a herd of guanacos was observed to visit every morning, but as the water only trickles down in a very small quantity, it can afford only a temporary supply. In short, besides a secure anchorage, this place affords no advantage, though convenient for sealing vessels to anchor in while employed in their occupation upon Penguin island.

Tides.—It is high water, full and change, in Sea Bear bay at 0h. 45m., rise 20 feet. The tide off the entrance is very rapid, and forms, even in a calm, strong ripplings, which in a breeze must be very dangerous for boats to pass through, and, indeed, not agreeable for vessels of any size. The flood sets to the NNE., and has been observed as much as 3 knots against a strong northerly wind. The ebb sets nearly in the opposite direction and about the same rate. Off Penguin island the northerly stream ceases at about 4 hours after high water by the shore.

Spiring bay lies between the south head of Sea Bear bay and Shag rock, which lies off Hilly point, 10 miles to the southward. It forms a deep bight, but is quite open to the south and east, and after a SW. gale, when the winds always veers to south and S. by E. there is a considerable sea. The shore is skirted by rocks some distance off, and the bay is quite unfit for anchorage. The land is of the same height as about Sea Bear bay, but has more lumps of rocky hills visible on the outline of its summit.

Shag rock is a whitish mass of bare rock, lying about 1½ miles off Hilly point. At 2 miles to the southward of it are four small dark-colored rocks; and a mile farther, rather a large rocky islet.

The highest and most conspicuous hill in Spiring bay is that situated 7 miles NW. of Hilly point. It shows as a good mark in all directions,

Vigia.—Off Spiring bay, a rock named the Eddystone (Sirius shoal), was shown on the old charts. It would seem that this rock and the Bellaco rock, mentioned hereafter, are the same danger; but the whole coast between cape Blanco and port San Julian is much strewed with shoals which are the more dangerous from the strong tides setting between them.

In directing the ship's course by night near this coast, regard should be paid to the tidal streams, which set with considerable strength, parallel with the shore; as a general rule, when the depth is more than 40 fathoms, there exists no known danger.

Desvelos bay.—At the distance of 22 miles to the SW. of Shag rock, is a low point named cape Watchman, the southern extremity of Desvelos bay. At 6 miles northward of the cape about one mile off shore is a shoal of 3 fathoms, with kelp on it. There are also many other shoal patches, usually marked by seaweed, with 7 to 9 fathoms between them.

The ground is foul and uneven for about 5 miles off cape Watchman, causing heavy tide rips. It is advisable to give the cape a wide berth and pass eastward of Bellaco rock. Northward of the cape, a hill named monte Video will be seen, somewhat resembling El Cerro at Montevideo, both in shape and color, but not quite so high.

Desvelos bay offers good shelter from westerly winds; but due allowance must be made for the tides, which sweep along the shore from 2 to 3 miles an hour.

Bellaco rocks, situated S. 40° E. (S. 56° E. mag.) distant 10½ miles from cape Watchman, consist of two rocks awash at high water, with kelp growing on most parts. The larger or eastern rock is about 100 yards long and 80 yards across. Within ½ mile of the south side of these rocks there are depths of 12 to 15 fathoms, rocky bottom; and on the east side, at the same distance, from 20 to 24 fathoms. Bellaco rocks at low water would be seen in clear weather from some distance, as there is a rise and fall of 20 feet.

Lookout point.—Foul ground.—From 4 miles southward of cape Watchman, to Lookout point, the land increases in height and the coast is safer; but 5 miles eastward of that point there is a large patch of foul ground with much kelp. The land still rises, in advancing to the southward, till it attains the height of above 600 feet, and is then remarkable for its horizontal outline. Flat and Bird islets, 11 miles to the southward of Lookout point, though low, are too near the land to be dangerous to vessels that keep a fair offing.

Dañoso reef.—At 9 miles to the southward of Flat islet, and off the high tableland of cape Dañoso, a dangerous reef projects 3 miles to the southeastward from the shore, but it does not appear to be steep-to. From thence to port San Julian there is no known danger.

Port San Julian is situated SW. distant 75 miles from cape Watchman. Mount Wood, 951 feet high, and visible from about 35 miles, is a good mark for this port, being flattopped and much more elevated than the land about it. The trend of the coast may also be useful as a mark; and the land about the port being higher than that on either side of it, no mistake can be made. Cape Curioso, the north point of entrance, is a low point jutting northward, formed of stratified cliffs, of which the upper part is white brown, and the lower black, or with black streaks.

A bar crosses the entrance, and forms in the middle an extensive bank just covered at high water, leaving a rather intricate channel on either side. The great range of tide makes the passing this bar comparatively easy, by previously observing the position of the banks at low water; but great attention should be paid to the set of the tides, which run sometimes at the rate of 4 miles an hour.

Desengaño point, on the south side of entrance, may be distinguished 6 or 7 miles off in clear weather. A spit extends about ¾ mile in a NE. by N. direction from the point.

Supplies.—No fresh water was found in any part of this inlet, its upper division being a chain of salt lagoons; but wood may be procured on Shag island, and at other places. Seafowl and fish are plentiful.

Tides.—It is high water, full and change, at port San Julian at 10h. 45m.; springs rise 30 feet; neaps 23 feet; and neaps range 16 feet.

Directions.—At about three-quarters flood is the best time for entering, as a vessel will probably then have depth enough on the bar, and the parts that dry at low water will still be visible. The most convenient anchorage is off Sholl point in 4 fathoms. The little monument erected by his shipmates to the memory of Lieut. Sholl is close to this point. If the tides do not serve for going in, anchor in 8 or 9 fathoms a good mile NE. of Desengaño point till a proper opportunity offers. But if the wind be SE., or the weather threatening, stand off and on.

Coast.—The coast to the southward of port San Julian is low, covered by scrubby bushes, and fronted by a shingle beach. At 10 or 12 miles south of the port a small flat hill is seen over the low coast hills.

In latitude about 49° 29′ S., the character of the coast changes to a range of steep white clay cliffs, the average height of which is about 315 feet. They rise, like a wall from the sea, which, at high water, nearly washes their base; but at low tide they are fronted by a considerable extent of beach of shingle and mud. Some short rocky ledges, which break at half tide, lie off several parts of this range, but none of them extend more than a mile from the shore.

Anchorages along the coast may be taken up with the wind off shore, at one to 2 miles from the beach, and in 9 to 14 fathoms oozy bottom. In latitude 49° 58′ S., the range of steep white cliffs begins gradually to diminish in height, and terminates at 9 miles farther to the southward, in North point, 180 feet high, forming the northern side of the entrance of Santa Cruz river.

Santa Cruz river.—The estuary of this name, about 16 miles in length, in a NW. and SE. direction, is formed by the junction of the Santa Cruz and the Chico rivers. At the entrance it is about one mile in breadth, increasing to 3 or 4 miles inside.

Santa Cruz is of importance from the fact of its being the only place on the east coast of Patagonia where large vessels can enter. Light craft can navigate to Pavon (Pabon) isle, 15 miles above Weddell bluff, but the channels are intricate.

The appearance of the coast about the entrance of this river is remarkable, and easily recognized. From the southward a coast line of cliffs and downs of considerable height is seen extending from the southward, as far as the eye can reach, and terminating abruptly in the high, steep, flat-topped cliff, mount Entrance (Argentine), 356 feet high, and the south point of the river; the land on the northern side of the river is low.

At 12 miles up the river, on the south bank, is Weddell bluff, a conspicuous headland 300 feet high; and 6 miles farther, on the opposite shore, is another named Beagle bluff.

Northern arm.—At Weddell bluff the river divides into two arms; the northern one, which passes under the east fall of Beagle bluff, was examined by Capt. Stokes for 12 miles above its commencement, where it ceases to be navigable, even at high water. Its bed was divided by banks of sand into several little fordable streams, preserving as far as the inequalities of the land would permit the eye to follow their course, a mean NNW. direction. The stream at this part was quite fresh, but still subject to the regular ebb and flow.

The shore on the SW. side of this arm is a range of clay cliffs, of the average height of 250 feet with grassy downs intersected with valleys and ravines. On the eastern side the land, for the most part, is low and level, with a shingle beach; the aspect of the country is dreary, and the vegetation scanty. Many brant geese and ducks were seen, as well as the common sea fowl of these parts; several ostriches also made their appearance on the beach, and traces of guanacos were observed.

Western arm, which is far the more considerable of the two, was examined for 33 miles. From Beagle bluff it trends westward 6 miles, with a mean breadth of 2½ miles. At 4½ miles up, the influence of the tides had altogether ceased, and the water was quite fresh. The stream ran clean and pure, with the velocity of at least 5 miles an hour, over a bed of pebbles mixed with dark sand, its mean breadth being ¾ mile, and depth in mid-channel 8 feet. It runs between two nearly parallel ranges of hills, about 4 miles asunder; beyond this the reaches are short, seldom more than 2 miles long, and forming tortuous courses.

Capt. Fitz Roy undertook an expedition up the river with three light whaleboats; they labored, by rowing or tracking, for sixteen days, when, their provisions falling short, they were obliged to abandon this interesting exploration and to return to the ship, which occupied but four days. The utmost point they reached was 140 miles in a direct line to the westward of the entrance, or 245 by the course of the river; and they were then within 30 miles of the foot of the snow-capped Andes.

Settlement.—At ½ mile below Weddell bluff is the settlement, composed of a small party of seamen, under the charge of an officer, stationed here by the Argentine Government, and who afford shelter and food to shipwrecked seamen.

Supplies.—Guanacos are plentiful and good eating, and the flocks and herds are rapidly increasing in the interior. Fresh water may be procured at the watering place at the settlement; above Weddell bluff the water is fresh the last half of the ebb. Firewood is obtainable.

A colonist is living with his family on Pavon isle, 15 miles above the settlement, and there are a few dwellings between.

Bar.—From 4 to 5 miles seaward of the entrance points is the bar, which stretches in a southerly direction from the north shore a distance of about 7 miles. This bar is an accumulation of mud and gravel, with shoal patches in places, some of which dry at low water about 6 feet, and others are denoted by breakers.

Volage bank, which breaks at low water, lies nearly 2 miles outside the bar, with mount Entrance bearing N. 40° W. (N. 58° W. mag.), distance $5\frac{8}{10}$ miles.

Beacons.—A white beacon is placed on the spit extending off Entrance point, and is used as a mark for the North pass. Two beacons are erected NW. of Shingle point.

Anchorage.—There is anchorage on the SE. of Sea Lion island, in about 6½ fathoms, in the bight near Keel point.

A good berth will also be found above Sea Lion island, and near the shore under Weddell bluff; but strangers should first anchor in the bight near Keel point, so that another ebb may expose to view the shoals that surround that island. The sloping shingle beach at Keel point, on the south shore, 3 miles within the entrance, where the *Beagle* was placed on the shore in 1834, offers a most convenient spot for beaching; and the great rise of tide (which must be considered when anchoring) and clean shore renders port Santa Cruz a most desirable place for that operation. It is advisable to moor. Violent squalls, but of short duration, have been experienced in the month of December.

With a fresh breeze blowing against the strong currents in the river, the navigation is somewhat dangerous for boats.

Tides.—It is high water, full and change, in the Santa Cruz river at 9h. 30m.; springs rise 40 feet; neaps rise 28 feet, with a velocity of from 2½ to 6 miles an hour. In the offing the tides flow regularly 6 hours each way, but turn 2 hours later than the time of high water inshore. The flood runs to the northeastward and the ebb to the southwestward.

Directions.—North pass, between the north shore and the dry banks on the bar, is the best channel. Mount Entrance (mount Argentine), on the south point of entrance to the river, may be approached bearing N. 85° W. (S. 77° W. mag.). The marks for crossing the bar are Entrance point beacon in line with dark-colored V-shaped notch in Ingouf cliff bearing N. 80° W. (S. 82° W. mag.).

Caution.—Where tides are rapid and a heavy sea frequent, it is not probable that a bar of sand and shingle stretching across the mouth of a large river should long retain its position. Strangers are therefore advised to remain outside the bar, either at anchor in about 8 fathoms, or under sail, till low water, when its shallow parts will show themselves; and then, as the tide rises very high, to weigh at half or two-thirds flood, and steer directly in through the most convenient of the channels.

Coast.—Between Santa Cruz and Coy inlet, a distance of 58 miles to the southward, the coast forms a considerable bight and consists of a succession of cliffs and low beaches. It is fronted by a ledge of rocks, which are either dry at half tide or are then shown by a line of breakers; they extend in some places a distance of 3 miles from the shore. This coast should not be approached within 5 miles; it affords neither fuel nor water.

From Coy inlet to cape Fairweather the coast is similar to that northward of the inlet, but more free from rocky ledges, and good anchorage may be had from 2 to 6 miles off shore in from 7 to 14 fathoms mud, the water shoaling gradually to the shore. The beach is of shingle to high water mark, and then of hard clay to just beyond the low water limit where a green muddy bottom commences. The outer edge of the clay is bounded by a ledge of rocks on which the sea breaks and which extends for some distance parallel with the coast.

Coy inlet is conspicuous, as it is the only part of the coast that has the appearance of an inlet between Santa Cruz and cape Fairweather.

It is said to be a shoal basin 19 miles in length, of some miles in breadth at high water, and fronted by a bar of rocks, with a passage of 6 feet water; inside there are places with from one to 3 fathoms, but in most parts of the inlet the banks are dry at low tide. The southern side of the inlet is cliffy, and at its head receives the drains of an extensive flat country.

Tides.—It is high water, full and change, in Coy inlet at about 9h. 30m., and the tide rises 40 feet.

Cape Fairweather is the southern extremity of the long range of clay cliffs, 300 to 400 feet high, that extend from Coy inlet. The interior is formed by open plains of undulating country, covered with grass and plants, but entirely destitute of trees. It abounds with guanacos. The cape, from a distance, with the low land to the southward below the horizon, has been mistaken for cape Virgins and the strait of Magellan, notwithstanding that there are more than 45 miles difference in the latitude of the two headlands. In fine weather, the Friars and other hills will assist in identifying the coast; in thick weather, the bottom will be of service, that off cape Fairweather being mud, whilst off cape Virgins it is gravel and coarse sand.

Water.—About 17 miles north of cape Fairweather there is a ravine where water may be obtained when the wind is off shore; it is much grown over with plants, and may not keep, but for a temporary supply it seemed good. Besides this fresh water may be seen trickling down the face of the cliffs at short intervals.

Port Gallegos.—The entrance of this port is formed on the north side by the cliffy land of cape Fairweather, and on the south by a low shore that is not visible at sea for more than 10 or 15 miles, excepting the hills in the interior named the Friars, the Convents, and North hill. It is fronted by extensive sandbanks, which extend about 7 miles off shore, most of which may be crossed at high water, but at half-ebb many are dry; others never dry, but are easily distinguished by the breakers upon them. The entrance is southward and westward of these banks, and parallel with the shore south of Loyala point. There is a settlement on the south bank of Gallegos river, 10 miles from its mouth, consisting of about a dozen houses. From this settlement there is an easy track to Sandy point in Magellan strait, available for wheeled vehicles. The journey occupies about three days. The climate is dry and invigorating. The settlers are engaged in raising cattle and sheep.

Anchorages.—A vessel should anchor about 2 miles off shore, with cape Fairweather about N. 19° W. (N. 37° W. mag.), and observe the channel and banks at low water before proceeding in. This anchorage is good, and sheltered from the prevailing winds.

Anchorage inside may be taken up on the south side, near Loyala point; to the northward the banks are extensive.

Caution.—The banks at the entrance of this port have changed considerably since the survey made by Capt. Stokes in 1828; H.M.S. *Nassau* in 1867 grounded in 8 feet at low water, close to where 10 fathoms were marked on the chart. As, however, there is a rise and fall of tide of 46 feet at springs, a vessel of moderate draft can always enter at half tide by keeping close round the southern point. No large vessel should attempt to go inside.

Directions.*—Approaching port Gallegos, the North Convent should be kept in line with South Friars until the south extreme of cape Fairweather bears N. 20° W. (N. 38° W. mag.), then steer for it, and round Loyala point at a distance of about 400 yards. When clear of the western part of this point, the houses of the settlement on the south shore may be steered for until the leading marks are seen over a square white house at the west end of the settlement. The outer mark consists of a pole with triangle, and the inner mark a pole with cage. These marks in line lead to the best anchorage in not less than 4 fathoms, loose shingle, between the pier and an extensive shoal in the middle of the river. Care is necessary to avoid this shoal as it dries about three-quarters ebb. Vessels should be prepared for dragging, as the holding ground at this anchorage is bad. H.M.S. *Basilisk* moored on the north side of the shoal during neaps, but at springs there would not be sufficient water. Half flood is the best time for entering and leaving port Gallegos.

Tides.—It is high water, full and change, in the entrance of port Gallegos at 8h. 50m.; springs rise 46 feet, the stream runs at the rate of 5 miles an hour.

Coast.—The coast from port Gallegos towards cape Virgins trends southeastward, and, for the first half of the distance, is formed by a low shelving shore, which at a few leagues at sea is not visible.

At 18 miles to the southward of cape Fairweather the cliffs again commence and continue to cape Virgins with only one or two breaks, in one of which, 8 miles north of the latter cape, a boat might land, if necessary. There is good anchorage along the whole coast between port Gallegos and cape Virgins, at 2 to 5 miles from the shore; but the bottom is rather stony.

Cape Virgins, the northern entrance point of Magellan strait, is 135 feet high, and when approaching the strait from the eastward is the best point to make, and usually the first land seen. In clear weather the cape is visible from 20 to 25 miles, and when made from the northward, between the bearings of S. 4° E. (S 22° E mag) and S. 86° W. (S. 68° W. mag) it will appear as an extreme of land; Dungeness spit, with its beacon will not be visible until much nearer. When cape

---

* These directions do not refer to the old survey. A new survey is in progress by the Argentine Government (1892).

Virgins bears westward of N. 82° W. (S. 80° W. mag), mount Dinero will show as a small nipple, opening clear of it.

Cape Virgins and cape Espiritu Santo, have certain points of resemblance, for both are marked with white cliffs forming the seaward termination of a range of hills of moderate height, extending into the interior; and both capes have low shingle points connected with them.

It may be observed that the most remarkable difference takes place in the appearance of the land according to the light in which it is seen.

Light.—*Proposed.*

Rocks.—The steamer *Cleopatra* was lost on a rock off cape Virgins, on which the steamer *Ville de Strasbourg* and presumably the steamer *Magellan* had previously struck, although the position of the rock on which this last steamer struck was given as in latitude 52° 18′ 45″ S., and longitude 68° 16′ 20″ W.

From data furnished by the captains of the *Cleopatra* and *Ville de Strasbourg*, the rock (*Cleopatra*) lies approximately in latitude 52° 16′ 30″ S., and longitude 68° 12′ W.

There are from 16 to 17½ fathoms in the immediate vicinity of the rock.

Sarmiento bank does not extend or change its position, the general outline of its outer edge being kept in that position, following the general line of the coast from the northward, by the rapid current which sweeps along it. The ridge of the bank is shingle, while inside of it is coarse sand and gravel mixed. Coming from the eastward or in a large vessel, it will be well to cross the bank well to the southward of Nassau rock, and the time of the tide between half flood and half ebb. There is a little kelp on Nassau rock, but not enough to mark it, and except in a gale of wind the sea does not break on it until nearly low water. At extraordinary low spring tides the rock is dry.

Caution.—The entrance to Magellan strait should be approached with great care. The velocity of the tidal streams, the variability of their direction off cape Virgins, and the absence of good objects with which to fix the ship, make the determination of position and the steering an intended course very uncertain.

Several reports have been made of vessels striking outside the limits of the dangers charted eastward of cape Virgins, but there is no evidence to show where they struck, as all the accidents occurred at night, and no bearings given, it seems very probable they all touched on the shoals extending from cape Virgins.

Winds and weather.—On this coast, between the parallels of 40° and 50°, much uniformity of weather prevails, those ten degrees of latitude causing less variation of temperature than could reasonably be supposed. The winds are also more regular than those about La Plata, and as the quantity of rain which falls during the year is beyond comparison less, the climate is at least as warm as that of Buenos

Aires, and so very dry that the land is generally parched and sterile, except near rivers. In some ports on this coast, San Blas, the Oven, San Antonio, and others, it is ruinous for a ship to lie moored during many summer months; even weeks of delay are injurious, so powerful is the effect of the sun, rarely clouded, and acting throughout the whole day upon the woodwork, unmoistened even by dew.

In winter there are sometimes sharp frosts at night, but they do not continue through the day. Snow is rarely seen; hail with southerly winds is common and very large. During the summer months, while the air is in a settled state, the wind generally backs round the compass during the twenty-four hours, a moderately fresh sea breeze from the SE. in the afternoon being succeeded by a land wind of similar strength from the NW. during the night; light winds or calms prevail in the mornings and evenings.

In settled weather, the wind always goes round against the sun from east to west by the north; when it takes the opposite direction, bad weather usually follows. Gales from the SE. occur once or twice in a month, and generally, it is said, about the full or change of the moon. In summer, or from November to May, these gales are heavy, and are very much felt on the coast, as they send a heavy sea into the harbors, and are sometimes accompanied by rain and thick weather. Other strong winds blow chiefly from the land, and bring clear pleasant weather; NE. winds sometimes bring rain, but they rarely, if ever, increase to the strength of a gale. During the winter season, or from May to November, southerly winds are more frequent, and last longer than in summer; more rain is brought at that time by winds from NE. and SE., but the latter wind is not usually so strong as in summer.

On this part of the coast, as well as in La Plata and about Tierra del Fuego, bad weather with northerly winds will continue until the wind shifts to the southward, going round by the west. Squalls or gales of more or less strength from SW. to SSE. soon clear the air, and the louder and longer the southerly wind blows, the finer and more lasting will the weather be afterwards. These southerly winds are dry, cold, and elastic; they cause the mercury in a barometer to rise unusually high, and have very beneficial effects upon the human frame.

With northerly and westerly winds there is at times much lightning and thunder, particularly during the warm weather. Winds from the northward begin and increase gradually; those from the southward are sudden, and at times they are instantaneously violent. Vessels should be always ready for a sudden shift to the southward when the barometer is low, with a northerly wind blowing, and the weather threatening.

Westerly winds are the most prevalent throughout the year, and they generally bring clear fine weather. Gales of wind sometimes begin blowing from the NE. while the mercury in the barometer is high; if moderate at first, the wind generally increases and draws to the northward as the mercury falls, until it reaches north and NW., when it blows hardest. Having continued to blow for twelve or twenty-four hours it moderates, perhaps falls entirely, particularly if there be rain, and in a few hours afterwards shifts to the southward, quickly increasing to a gale, which will be strong in proportion to that which preceded it; or perhaps it may shift suddenly in a squall to the southward, and blow with violence.

The rising of the mercury always precedes, by an interval more or less short, this change from a northerly to a southerly wind. Northerly gales are preceded by gloomy overcast weather, by numerous small clouds apparently very high in the air (cumulo-strati and cirro-cumuli) sometimes by a mistiness or a thick haze, and sometimes by much lightning. Southerly gales may be foretold by large masses of heavy clouds, with hard defined edges (cumuli), rising in the southern horizon.

Barometer.—Very thick gloomy weather, with northerly winds, and perhaps rain, with lightning and thunder, is sure to end in a sudden shift to the southward. If the mercury be low—that is to say, about 29·60 in a barometer averaging 30 inches in settled weather—a gale may be expected. After falling, the mercury will rise shortly before the wind shifts, and therefore the time when the mercury ceases to fall and begins to rise should be carefully noticed. The mercury rises higher with SE. than than with SW. winds. Northerly winds cause the mercury to fall; it falls most with the wind at NNW. and rises most with the winds from the SE.

During settled clear weather a SE. wind will raise the mercury to near 30·50 inches. With weather equally settled, and apparantly equally clear, a NW. wind will depress it to 29·80.

Fogs.—With moderate northwesterly winds, dense fogs have been experienced from February to October, inclusive, between latitude 46° S., longitude 60° W., and latitude 38° S., longitude 52° W. On each occasion the fog cleared when the wind shifted to the southward of west. Fogs occur during the winter months, but they are neither frequent nor are they of long duration.

Squalls are less numerous, and give more warning than in most other parts of the world, but when they do rise they are not to be trifled with. Those from the southward sometimes require nearly all sail to be taken in; and if the barometer has been very low, and the clouds look very heavy, and you can not see underneath them, it will be prudent to furl almost every sail and even to run before the first heavy blast, which seldom lasts many minutes. If attention be not paid to this advice, dearly purchased experience will soon teach the propriety of this cautious prudence, and especially to those who navigate small vessels in this climate.

Currents.—When more than 50 miles from the coast of Patagonia very little current is found during settled weather and moderate winds; what there is sets sometimes north, and at other times south, about ½ mile an hour; but before strong winds, and while they are blowing, the current runs a mile, or perhaps 2 miles, in the same direction as the wind. Generally speaking, the southerly currents have more strength and run longer than the northerly; they are, however, very irregular. Nearer than 50 miles from the land the current sets more strongly from 2 to 3 miles an hour, particularly near the projecting headlands. When nearer than 20 miles to the shore the influence of the tides begins to be felt, especially if to the southward of cape Corrientes.

Tidal streams.—Along that dreary and almost unbroken coast extending from cape Corrientes to Bahia Blanca, the stream of the tide is very weak, although the water rises and falls about 10 feet. The great tidal wave from the southward here appears to end, after sweeping along the southern half of South America. In the archipelago of Tierra del Fuego the flood tide comes from the NW., passes round cape Horn, and through the strait of Le Maire, and then, from cape St. John, sets strongly to the eastward and northeastward. From thence the flood runs to the NE., along the north side of Staten island and Tierra del Fuego, occasions very high tides at the entrance of Magellan strait, where it unites with the stream which has come directly through the strait, and passing onward along the coast of Patagonia, produces high water at each place in succession until it is lost near cape Corrientes.

Near the coast between the dangerous banks of San Blas and Bahia Blanca, the flood and ebb streams set nearly north and south, from one to 4 miles an hour, according to the wind and the age of the moon. Between the banks of San Blas and the rio Negro, the tides are regular, running a little more than six hours each way, if not affected by the wind, with a velocity of 2 to 5 miles an hour; these strong and dangerous tides are not much felt at the distance of 15 miles from the land. Between San Blas and cape Bermeja the tidal stream sets NE. and SW., about equally strong each way.

In the depth of the gulf of San Matais there is very little stream of tide, but a rise and fall of from 20 to 30 feet.

In the gulf of St. George there is not much stream of tide. Off capes Dos Bahias and Blanco, particularly the latter, the tides are again strong, and there are races off cape Blanco almost as dangerous as those off the peninsula of San José.

In navigating this coast the mariner should bear in mind that there is a difference generally of half a tide between the turn of the tides in the offing and of high or low water in the harbors and along the shore; the turn of the stream in the offing being three hours later than the corresponding turn of the tide inshore. In other words, the northern or flood stream in the offing runs three hours after the tide has begun to ebb on the shore, and the converse.

Tidal races.—Off the peninsula of San José there are dangerous tidal races, and so high and so violent are the waves at particular times of tide that a small vessel might be most seriously injured, if not totally destroyed, by getting into them. Lieuts. Wickham and Stokes, R.N., while surveying this part of the coast in two small crafts, were drawn during a calm within a mile of one of these races while it was roaring and boiling furiously. No anchorage could be had, for no bottom could be found within the deep sea lead, and they were fast approaching the fatal race when a breeze fortunately sprung up, which enabled them to stem the stream, and after a struggle with oars and sails at last to overcome the tide and avoid the danger.

Near the entrance of the bay of San José there are violent races at times, but not equal in effect to those at the east side of the peninsula.

SOUTH ATLANTIC OCEAN—ICEBERGS IN VARIOUS LOCALITIES.

Information has been received that the commander of the British ship *Cromdale* reports having sighted in April, 1892, large numbers of table-topped icebergs of enormous size when in latitude 46° S., longitude 36° W.

Icebergs have latterly also been met with in the following localities:

From latitude 43° 58′ S., longitude 38° 02′ W., to latitude 41° 02′ S., longitude 35° 26′ W., numerous icebergs were seen.

In latitude 44° 23′ S., longitude 36° 56′ W., an impenetrable ice barrier was seen stretching away for many miles.

From latitude 42° 08′ S., longitude 34° 52′ W., to latitude 41° 34′ S., longitude 34° 19′ W., many icebergs have been seen.

In latitude 52° S., longitude 46° W., icebergs were seen and constantly passed to latitude 40° S., longitude 34° W.

From latitude 41° 20′ S., longitude 34° 40′ W., a compact mass of icebergs extending in a northeasterly direction for 40 miles.

Another vessel passed icebergs constantly from a position in latitude 51° S., longitude 45° W., to latitude 38° S., longitude 28° W.

Icebergs have been seen in latitude 39° 17′ S., longitude 30° 18′ W.

In January, 1893, icebergs were met in the following localities:

From latitude 51° 30′ S., to 49° 50′ S., and about longitude 46° W., 63 icebergs, from ½ mile to 3 miles long and 200 to 300 feet high, were seen. Also an ice island, estimated to be over 30 miles in length and 300 to 400 feet high, was passed at the distance of about 5 miles. This island and the bergs were probably drifting in a NE. direction.

Capt. A. Doane, of the American ship *Francis*, reports that on the 16th, 17th, and 18th of February, 1893, he passed an immense barrier of ice, interspersed with numerous large and small bergs, extending between latitudes 50° 13′ and 51° S., longitudes 47° 33′ and 46° 45′ W.

"February 16, noon, latitude 51° 01′ S., longitude 49° 15′ W., passed between two large bergs about 15 miles apart and saw another very large berg several hundred feet high and a mile or more in length.

"17th, 4 a. m., latitude 50° 40′ S., longitude 46° 45′ W., saw an immense barrier of ice extending from NW. to SE. as far as could be seen from aloft, interspersed with large and small bergs.

"17th, noon, latitude 50° 54′ S., longitude 47° 12′ W., passing numbers of bergs, large and small, the barrier still in sight, extending in same general direction.

"February 18, noon, latitude 50° 29′ S., longitude 47° 12′ W., the barrier still in sight. A very strong NE. current was observed setting towards the barrier, and a very large and turbulent sea was caused by its deflection from the ice pack at a distance of from 2 to 4 miles.

"4:15 p. m., latitude 50° 13′ S., longitude 47° 23′ W., passed the NW. point of the pack. This point consisted of a large field of ice between 300 and 400 feet above the sea level, measuring by patent log 6 miles in length and estimated as from 3 to 4 miles wide, making an unbroken area of 18 or 20 square miles."

As this field lies in the fairway of vessels to the eastward round cape Horn special outlook should be kept.

In June, 1893, a large iceberg was reported in latitude 45° S., longitude 60° W.

During the last seventy years very extensive masses of ice have been from time to time found in this locality, see Admiralty Ice Chart of the Southern Hemisphere, No. 1241.

CHAPTER XIII.

FALKLAND ISLANDS—GENERAL REMARKS—EAST FALKLAND.

The Falkland islands, belonging to Great Britain, form a group in the South Atlantic, consisting altogether of above one hundred islands. They lie off the coast of South America, about 350 miles eastward of Magellan strait. Only two of the islands, named East and West Falkland, are of any considerable size, and these are separated from each other by a sound varying in breath from 2½ to 18 miles. The whole group comprises an area of 6,500 square miles, and is indented in a remarkable manner by sounds and bays, which form excellent harbors, and these, together with the varied outline of the mountains, constitute the principal features in the general aspect of the country.

These islands were seen by Davis in 1592, in Cavendish's second voyage, and visited by Hawkins in 1594. In 1690, Strong sailed through the channel which separates the islands, and named it Falkland sound, which name afterwards was transferred to the whole group. In 1710 a French vessel from St. Malo touched at them, and named them Iles Malouines. Settlements were afterward formed on them by the French, Spaniards (who term the group "Malvinas") and English alternately, which will account for the foreign names of some of the ports and harbors; they have ultimately remained in possession of the English.

The government is administered by a governor, who resides at Stanley, aided by an executive and legislative council. The members of both councils are appointed by the Crown.

Nearly all the islands of any size are inhabited. The positions of the settlements will be seen by a reference to the chart, a knowledge of which would be invaluable to shipwrecked mariners seeking relief.

The population in 1882 amounted to 1,583. The exports consist of wool, provisions, hides, horns, hoofs, bones, and tallow.

Aspect.—In the general appearance of the Falkland islands there is little remarkable. Ridges of rocky hills above 1,000 feet high are seen traversing extensive tracts of moorland, without a tree, and bounded by a low rocky coast. On the northern part of East Falkland the hills attain a considerable elevation, but the whole of the south portion is so low that it can barely be seen from the deck of a ship at 5 miles distant. The principal range of hills are the Wickham heights, stretching east and west, and culminating in mount Usborne, 2,245 feet in height, near the western extremity. The average height of the western island is slightly greater than that of the eastern, the highest peak, mount

Adam, in the NW. part of the island, reaching 2,290 feet above the level of the sea. On the western face of the island, and on some of the adjoining islets, there are some precipitous cliffs, exposed to the fury of the western seas. The summits of the hills and mountains are rugged, terminating in points and ridges, are seldom rounded, and never tabular.

Harbors.—Excellent harbors, easy of access, affording good shelter, with the very best holding ground, are formed by the remarkable indentations of the coasts, and abound among those islands; with due care they offer ample protection from the frequent gales.

Productions.—A remarkable feature in the botany of the Falkland islands is the entire want of trees, but there is a great variety of sweet scented flowers, which in November and December nearly cover the ground. The tussac grass, a gigantic sedgy grass, having blades 7 feet in length and ¾ inch in breadth, was formerly abundant on the mosses, but since the importation of cattle, has disappeared, except where fenced, and on the detached islets. Anti-scorbutic plants are very plentiful in a wild state, such as celery, scurvy-grass, sorrel, etc.; there are also cranberries, and what the settlers call strawberries, a small red fruit growing like the strawberry, but in appearance and taste more like a half-ripe blackberry. A little plant which grows like a heath in many parts of the Falklands, as well as in Tierra del Fuego, has long been known and used by the sealers as a tea plant, but it has a peculiar effect at first upon some people, which is of no consequence, as it soon goes off. Potatoes and other vegetables are grown, but are not usually plentiful.

Animals increase here rapidly, and the quality of their hides or fur improves. It must be remembered that cattle are no longer wild, but are the property of some owner, and there is a penalty for shooting them. Horses, pigs, cattle, hares, rabbits, snipe, geese, and duck are plentiful; sheep have been introduced and found to do exceedingly well. Fish swarm in every harbor during the summer months, and excellent trout are to be caught in the lakes. Mussels and clams are abundant.

Should any accident happen to a vessel in doubling cape Horn, obliging her to make for the nearest port at which she could obtain supplies, she would find all she required at the Falkland isles.

Caution.—Water found in pools about the islands should be avoided for drinking purposes. It has caused loss of life amongst those out on shooting excursions.

Winds.—Wind is the principal evil at the Falklands. It would be difficult to find a region more exposed to storms both in summer and winter. The winds are variable and at times very violent, seldom at rest while the sun is above the horizon. A calm day is an extraordinary event during the summer season. Generally speaking the nights are less windy than the days; but neither by night nor day, nor at any season of the year, are these islands exempt from very sudden and severe squalls, or from gales which blow heavily, though they do not usually last many hours. It has been stated by Bougainville and others that in summer the wind generally freshens as the sun rises, and dies away about sunset; also that the nights are clear and starlight. Such may be the case, yet it is also true that there are many cloudy and many windy nights in the course of each year or of each month.

The westerly wind is the prevalent one. Gales as a general thing commence in the NW. and draw or fly around to the SW. When rain accompanies a NW. wind it soon shifts to the SW. and blows hard. Northerly winds bring cloudy weather, and when very light they are often accompanied by a thick fog. It is stated that they almost always occur about the full and change of the moon.

NE. and northerly winds bring gloomy overcast weather, with much rain. Sometimes they blow hard and hang in the NNE., accompanied by thunder and lightning and rain, but it is more common for them to draw round to the westward. Southeasterly winds also bring rain. They are not frequent, but they blow hard, and as the gale increases it hauls to the southward. During the winter season the winds are principally from the NW., and in summer they are more frequently from the SW. Gales of wind, as well as squalls, are more sudden and blow more furiously from the southern quarter, between SW. and SE., than from any other direction.

Wind from the east is rarely lasting or strong; it brings fine weather and may be expected in April, May, June, and July rather than at other times; but very short intervals of fine weather, with light breezes from ESE. to ENE., occur occasionally throughout the year. Thunder and lightning are very rare; when the latter occurs easterly wind may be expected to follow. If lightning is seen in the SE., with a low barometer, a hard gale from that quarter may be expected. SE. and southerly gales last longer than those from the westward, and they throw a very heavy sea upon the southern shores. In the winter there is not generally so much wind as in the summer, and in the former season, the weather, though colder, is more settled and much drier. Fogs occur, with light easterly or northerly winds, but they do not last through the day.

Every material change in the weather in the neighborhood of these islands is foretold by the barometer.

Barometer.—The mean pressure for the year 1876 was 29·616 inches, and for 1877, 29·575 inches; the highest monthly mean for the years 1875–'76–'77 was 29·761 inches, in September, 1875; and the lowest 29·342 inches, in February, 1876. The maximum pressure registered was 30·479 inches, on July 31, 1877, at 9 a. m., and the minimum 28·559 inches, on September 19, 1877, at 9 a. m.

The tides differ much as to strength and directions in different parts of this group, but the times of high water, full and change, are between

5 and 8 h.; the range is almost similar everywhere, about 8 feet at springs and 4 feet at neaps, but there is a considerable diurnal inequality. The great tidal wave which causes the streams among these islands comes from the SE., and splits off Lively island; one part of the flood stream running to the northward, the other to the southwestward past Sea Lion islands, from one to 2 miles an hour near the shore. Along the south, west, and north shores it increases in strength, until among the Jason islands on the NW. side, it runs 6 miles an hour and causes heavy and dangerous races. Into Falkland sound the flood stream enters at both ends, meeting near the Swan islands, and causing a double high water.

Currents.—There is a general current setting past these islands from SW. to NE., a current which continually brings driftwood to their southern shores. In all parts of the southern shores that are open to the SW. the beaches or rocks are covered with trees which have drifted from Staten island or Tierra del Fuego. Large quantities of this driftwood is found between cape Orford and the Choiseul bay. At sea, when to the northward and eastward of the Falklands, great quantities of floating seaweed are seen, besides trunks and branches of trees. These sure indications of a current from the SW. have been met with 200 miles to the northward of Berkeley sound. There is nothing to show that this current ever runs more than 2 knots an hour under any circumstances, and in all probability its usual velocity is even less than a knot. After long continued southeasterly gales there is said to be a strong set to the northwestward. Vessels from cape Horn, therefore, intending to sight Beauchêne island should make due allowance against a possible set 20 or 30 miles a day to the northwestward.

Thermometer.—The warmest month is January and coldest July. The annual mean temperature is about 43°. The maximum temperature registered during the years 1875–'76–'77 was 76° on January 27, 1877, and the minimum 18·9° on July 17, 1877.

Rainfall.—The rainfall is not large, the annual amount being about 20 inches, yet the number of rainy days is considerable, the rain falling generally in small quantities.

Climate.—Ice has not been known to exceed an inch in thickness; snow seldom lies on the low lands, or at any period exceeds 2 inches in depth. Although rain is frequent, it does not continue falling for any considerable time; and as evaporation is rapid, in consequence of so much wind, there are no unwholesome exhalations; indeed, the climate is exceedingly healthy, and no disease whatever has been hitherto contracted, excepting ordinary colds or coughs, or rheumatic affections brought on by unusual exposure to the weather. It is said by those who have had the most experience, that the climate of West Falkland is milder than that of the eastern island. Probably the west winds are chilled in passing over the heights, and upon reaching Stanley harbor become several degrees colder than when they first struck upon the western islands.

Caution.—Kelp.—In approaching any part of the Falkland islands, and especially while entering a harbor, a careful lookout should be kept for "fixed kelp," or the seaweed which grows on almost every rock that is covered by the sea, and not very far beneath its surface. Lying upon the water, the upper leaves and stalks show almost as well as a buoy, where there is a possibility of hidden danger. Long stems, with leaves lying regularly along the surface of the sea, are generally attached to rocky places, or else to large stones. In passing to windward of patches or beds of kelp, or rather in passing on that side from which the stems stream away with the current, care should be taken to give the place a wide berth, because the only part which shows when the tide is strong, lies on one side of, not over the rocks. Where the stream of tide is very strong, this kelp is quite "run under," or kept down out of sight, and can no longer be depended on as a warning. When a clear spot is seen in the middle of a thick patch of fixed kelp one may expect to find there the least water.

In general, danger will be avoided by keeping clear of kelp, but this must not prevent attention to the lead, as the rule sometimes fails. If the entrance to a port can not be gained by good daylight, a vessel should stand off again, as the kelp is the only true guide in entering.

Drift kelp, or that which is floating on the surface of the sea, unattached to any rock or stone, of course need not be avoided, and it may generally be known by its irregular huddled look.

Communication.—There is mail communication with England twelve times a year by the German "Kosmos" Steamship Company. The steamers call at Stanley on their way to Callao six times a year, and on their return voyage six times a year. Between Stanley and Dartmouth, occupies a period of five weeks. Mails for the islands are also taken to Punta Arenas by the Pacific Company's steamers, where they are picked up by the Kosmos steamers. Communication between the islands is kept up by means of two small steamers.

Making the land.—Vessels approaching the Falkland islands from the northward should endeavor to obtain soundings off cape Corrientes, in about latitude 39° S., when the longitude could be verified; for the edge of the bank is so steep that in a distance of 10 miles the depth changes from 100 fathoms no bottom, to 60 fathoms sand; and by sounding every 2 or 3 miles, until on the edge of the bank in about 80 or 90 fathoms, the longitude may be obtained within a very few miles. In the parallel of 39° S. the edge of the bank is in longitude 55° 45′ W., in latitude 41°, in about longitude 56° 55′; and in latitude 45° in about longitude 60°.

Should a vessel be unable to get in with the coast so as to strike the edge of the bank as far north as latitude 39° S. she should endeavor to do so as soon afterward as possible, taking advantage of every northerly and NW. wind to steer about SW., in order to make up for what she is certain to be driven to the SE. when the wind draws to the

SW., which it does at least every second or third day. By persevering in getting to the SW. whenever the wind will allow it, until to the westward of longitude 60° W., there will be no fear of being driven to the NE. of the islands; whereas if a vessel make a straight course for the islands when the wind is fair she will be almost certain of being driven to leeward by the frequent southwesterly winds, and find great difficulty in getting to windward again. Having, if possible, kept as far to the westward as longitude 60° W., until in latitude 49° 30′ S., soundings will be obtained on the bank to the northward of the Falklands in about 80 to 85 fathoms fine dark sand. If the longitude can be depended on a course may then be steered to make the land about 20 miles to the westward of Volunteer point, entrance to Berkeley sound; but if the position of the vessel be doubtful, or the wind draw round from the NW. toward the SW., it would be better to keep to windward so as to make the Eddystone rock.*

This rock can be seen in the darkest night if the horizon be clear before a ship would be in danger, as there is deep water close round it; but if the longitude be uncertain it would be better, in the night, not to run on, after shoaling to 50 fathoms, should the wind be toward the shore, as a vessel might pass the Eddystone and become embayed in the deep bight to the westward of it.

The same rule should apply in thick weather, which is always the case with northerly and NE. winds; but if a vessel has had observations shortly before, and can depend on her position, she may run for the NE. point of the island in any weather; and if the land be not seen about Macbride head, or cape Carysfort, when the water shoals to 40 fathoms, her head should be put off shore until daylight, or until a break in the thick weather enables the land to be seen; but the days of thick weather are very few, and it is not often that the land can not be seen when 20 miles off.

In coming from the northward the most eastern hills seen are those immediately over Berkeley sound. The first appearance of the land is very unfavorable. Rugged hills, the summits of which are stony and very light colored, have made many suppose that the high land is always covered with snow; but this is rarely the case from October till April or May, except patches in the hollows of the mountains, which sometimes remain till November.

There is a current setting to the NE., probably part of the Cape Horn drift, which has been found 500 miles from these islands, seaweed, driftwood, and a rippling of the water strongly marking its existence.

---

* A rock was reported by the *Eagle* in 1817, in latitude 51° 51′ S., longitude 64° 30′ W. This position was examined by Fitzroy and others without finding any trace of its existence; and it has been considered that floating ice with *débris* had been seen. The French vessel *Courier du Pacifique* (1884) reports a rock in latitude 52° 10′ S., longitude 64° 37′ W., which is also considered to be floating ice. Care should be exercised when in this locality.

Off the Falklands, penguins may be seen and heard 300 miles from the land. They need not, therefore, cause any alarm. One sign, however, is well worth noting, viz, that of the diver bird or shag, which is rarely seen more than 10 miles off the land.

Caution.—During and after long-continued southeasterly gales, when a heavy sea is rolling in on the south and SE. coasts of the Falkland islands, there is stated to be a strong set to the northwestward, to which set has been attributed the loss of several vessels in the neighborhood of Bull point. Vessels from cape Horn, therefore, intending to sight Beauchêne island should make due allowance against a possible set of 20 to 30 miles a day to the northwestward.

EAST FALKLAND ISLAND.

Cape Dolphin is a long, low, narrow strip of land jutting out from the NW. part of East Falkland. There is a shoal about ¾ mile to the SW. of it, marked by kelp. With northerly winds a heavy sea prevails all along the coast, from cape Carysfort to cape Dolphin, and between the latter cape and the Eddystone there runs a turbulent race, which would often be fatal to very small vessels.

Eddystone rock, lying N. 43° W. (N. 56° W. mag.), distant 4 miles from cape Dolphin, is 260 feet high, and from a distance of about 8 miles resembles a ship under sail. It is steep-to in all directions.

Cape Bougainville is eastward 20 miles from cape Dolphin. Between them the coast slightly indents, and an indraught was observed. The depth of water at a distance of 4 miles is from 40 to 45 fathoms (a fine greenish-colored sand, with small black specks), gradually decreasing to 12 fathoms close to the shore. At 4 miles westward of cape Bougainville is Lion point, westward of which a cluster of rocks extends a distance of 1½ miles, with 10 fathoms water at 200 yards to the northward.

Port Salvador, lying 9 miles southeastward of cape Bougainville, is a magnificent and spacious port, but difficult to enter on account of its narrow channel, as well as from the rapidity of the tides, which sweep the kelp under water and cause in many parts of the channel a violent race. Moreover, the water is deep and the bottom hard; consequently it is doubtful whether an anchor would hold if found necessary to let one go. The extent of the narrow passage to the port is 7 miles, between Hut and Platt points. It is more difficult to enter than to quit, as the wind generally blows outward. and it is absolutely necessary for a sailing vessel to have, on entering this port, a good commanding breeze.

Caution should be used when passing the entrance of port Salvador, as the tide rushes in strongly, and the reefs on either side, which extend a good mile off shore, make it dangerous if a vessel should get embayed in bad weather.

Tides.—It is high water, full and change, in the lagoon at the entrance at 8h. 10m.; springs rise 8 feet, and in the port, 5 feet. The ebb runs in the entrance at the rate of 6 miles an hour.

Directions.—The best time to enter port Salvador is at low water, or the early flood, and to leave it at the last quarter ebb. The usual passage in, with a fair wind, is westward of Center island. In working in, after passing well to the southward of Mid rock, it is advisable to cross over between it and the island and work up on the eastern side, as the water is not so deep nor the tide so strong as on the other side of the island.

After passing Center island there is more working room, and anchorage for one vessel may be obtained at the mouth of the lagoon, on the west side, in 7 fathoms good bottom, but it shoals suddenly to 2 and 3 fathoms. Having cleared the entrance channel good and secure anchorage is found all over the port. The strength of the tide is trifling everywhere except in the channel and between some of the islands. and there it seldom exceeds 1½ or 2 miles. The dangers are nearly all visible. The coves and creeks abound with fish and the shore with cattle, rabbits, and wild fowl, heath fuel, and good water.

Cape Carysfort.—Macbride head is situated about 11 miles eastward of port Salvador, and cape Carysfort, 150 feet high, is 6 miles beyond. Both these capes are cliffy, and a projecting point between them has small detached rocks off it, which show plainly in coming along the land. Cape Carysfort may be passed at a mile distance, and the low land and rocky islets, which form Volunteer point, will then be distinctly seen.

Cow bay lies close to the southward of cape Carysfort, and affords clean sandy anchorage in 7 or 8 fathoms, open to the eastward. It is easily known by its white sandy beach and the bluff land about the cape; and, at the close of the evening, vessels bound to Stanley might find it convenient to drop an anchor here for the night.

Uranie rock lies S. 74° E. (S. 87° E. mag.) one mile from the rocky islets off Volunteer point; a berth of 2 miles, therefore, should be given to them in order to clear this rock. It is the more dangerous as with westerly winds the sea seldom breaks on it, and it is without kelp. By keeping cape Carysfort to the westward of N. 55° W. (N. 68° W. mag.) until mount Low bears S. 50° W. (S. 37° W. mag.), or cape Pembroke light S. 16° W. (S. 3° W. mag.) a vessel will pass nearly 2 miles outside of it, and may then haul up for mount Low, the most eastern high hill on the island. The mount may be easily seen on a clear night when to the northward of Volunteer point; the summit, which is 840 feet high, forms two peaks, and from the eastern one the land slopes down to the point that divides Berkeley sound from port William.

Berkeley sound.—The entrance to this capacious sound opens out directly after passing Volunteer point, and can not be mistaken. It is 4½ miles wide at the entrance between Eagle point on the north and

Kidney island on the south, and 16 miles in length, terminating in the three excellent anchorages of Johnson harbor, Stag road, and port Louis. After passing Eagle point, from which a reef extends ½ mile, the sound is clear of all danger up to Sea Lion rocks. These rocks appear at a distance like two or three small boats; and vessels bound to either of the above three anchorages should in the first instance steer for these rocks, the dangers round which are well marked by kelp.

Berkeley sound may be entered by night, if the entrance is made out before dark; and may even be worked into safely till nearly abreast of Johnson harbor, where a vessel can anchor in 12 to 15 fathoms, outside the kelp patches off Long island, but rather to the southward of mid-channel, to avoid getting too close to Sea Lion rocks, which can not be seen on a dark night.

Johnson harbor, in the NW. corner of Berkeley sound, is ⅝ mile wide at entrance from kelp to kelp, which shoots up there in 5 or 6 fathoms, and marks well the limits of the channel. Off Lamarche point the kelp will be seen to run out a long way, with another large patch opposite to it, which together narrow the passage to ¼ mile. After clearing these the vessel may boldly proceed up the harbor and anchor off Magellan cove, in 5 to 6 fathoms, stiff mud.

The watering place is at the NW. corner of Magellan cove, but it is inconvenient, as the beach shelves out a long way. If not in want of water, a better berth may be found farther to the westward for the sake of shelter during heavy SW. and southerly gales, which raise a heavy sea off Magellan cove; the landing, also, is more sheltered on the western shore.

Stag road offers a still better anchorage for large vessels off Bougainville creek; the two large kelp patches may be passed close to, and a large vessel may work in and anchor in 4½ to 6 fathoms in any part of the road. The best berth will be found in mid-channel between Hog island and the north shore; but it is 2 miles from the watering place, which is to the westward of the Carenage.

Port Louis, in the western extremity of Berkeley sound, has its main entrance between Long island on the south and Peat islet and Hog island on the north; but a rocky patch nearly in mid-channel contracts the passage to a breadth of little more than 200 yards. After passing this patch keep to the northward of Round island.

This anchorage is nearly landlocked; the most convenient berths for small vessels are off the Carenage, in 3 fathoms, about ¼ mile from the shore, or farther to the southward, in 3½ or 4 fathoms.

The Carenage at its entrance is scarcely more than 100 yards across, but expands to a sheet of water of nearly a circular form and nearly ½ mile wide; from the shoalness of the water, however, it is only adapted for boats. The old settlement was on its western side.

Tides.—It is high water, full and change, in Berkeley sound at 5h.; springs rise 7 feet.

Cape Pembroke.—Cape Pembroke is the eastern extreme of a white sandy promontory forming the south side of port William.

Light.—About 100 yards from its extremity is an iron circular tower, 60 feet high, painted white, from which is exhibited, at an elevation of 110 feet above the sea, a *fixed* white light, visible seaward from a distance of 14 miles in clear weather. The light is visible between the bearings of S. 32° E. (S. 45° E. mag.) and N. 67° E. (N. 54° E. mag.) through north. Uranie rock bears from it N. 4° E. (N. 9° W. mag.), distant 9½ miles, and Wolf rock and reef, which is triangular and about 600 yards in length, each side, bears S. 22° W. (S. 9° W. mag.) 2¾ miles.

Pilots will be found off the lighthouse for Stanley harbor.

Port William, which includes Stanley harbor, is entered between William point on the north and cape Pembroke on the south, a distance of 2⅓ miles, and is well marked by the lighthouse on the latter. It affords good anchorage, sheltered from all the prevailing winds.

William point is low and rocky; near its extremity is a beacon having a basement of stonework surmounted by a triangular top, 26 feet high, which is visible in clear weather from a distance of 5 miles.

Charles point, also on the north shore, has two small detached rocks at its extremity, off which there is a kelp patch, extending about ⅓ mile; there is deep water close to the edge of the kelp.

Seal rocks lie about ¾ mile northeastward of cape Pembroke, and are clean on all sides. The tide runs north and south 3 miles an hour between the cape and the rocks, the flood stream setting to the northward and the ebb to the southward.

William islets lie about ½ mile off the south shore of port William between cape Pembroke and Yorke point, and are steep-to beyond the kelp.

Billy rock lies between William islets and Seal rocks, with cape Pembroke lighthouse distant 900 yards. It shows at half tide, or when there is much swell, but at high water it is covered; there is a little kelp close around, and deep water close to its east side. This rock is more particularly to be guarded against in leaving port William to pass round cape Pembroke with an ebb tide, for there is no tide felt while running out of the port till near the rock, and then, the outside tide being met running strongly to the southward, it is very likely to sweep a vessel toward the rock, unless allowance be made for it. The passage between Billy rock and East William islet should not be attempted.

Yorke point, about one mile west of William islets, on the south shore, is steep-to and may be approached to 100 yards. The entrance is wide enough for large vessels to work in, and the edge of the kelp is a secure guide; but the white sandy bay on the south side should not be entered, as it is shallow. In standing toward it a vessel should tack when in the line of the islets and of Yorke point. When past Yorke point, Sparrow cove will be seen open on the north side of the port, under mount Low, and the entrance of Stanley harbor on the south side.

Anchorage.—Vessels that remain in port William will find good anchorage in Sparrow cove and an unfailing supply of good water in its NW. corner. Nearly ½ mile from the entrance of the cove is Doctor point, on which stands a sign post pointing to the Narrows of Stanley harbor; there is a similar one on Tussac point.

Murrell river.—At the head of port William, a long creek winds through the hills to the westward, up to Murrell river, its whole extent being about 3½ miles. It varies in width from 400 yards to 100 yards for the first mile, with a depth of 3 to 2 fathoms, beyond which it shallows rapidly, so that a boat can not get up until the tide begins to flow. The landing on all the beaches is bad for boats, in consequence of bowlders; the best landing is on the rocks where the shores are steep-to. There is a very good watering place on the west side of the cove on the north shore, in a bight outside the entrance to Weir creek; but care must be taken in landing on account of the stones. Nearly every hollow has a small stream running through it, and peat is plentiful.

Stanley harbor.—The entrance to this harbor is little more than 200 yards wide, between Engineer point on the east, and Navy point on the west, both of which points may be passed at 30 yards, and all dangers are marked by kelp. The harbor is excellent, being a large natural dock, 3 miles long, east and west, by about ¼ mile broad, and the bottom of stiff mud. On the south shore, on the slope of the Murray heights, stands the town of Stanley, the seat of government.

The United States is represented by a consul and vice-consul.

Supplies.—Stores of every description can be obtained in Stanley harbor. There are two hulks with means for heaving vessels down. Mutton and beef of the very best description at 8 cents per pound may be purchased in any quantity, but vegetables are scarce. Water is kept in a government reservoir, containing 200 tons, and it can be obtained for 60 cents per ton; or water will be sent off by a private firm, at a charge of $1.80 per ton. Wood is scarce, but peat, which is a fair substitute for it, is plentiful, and when compressed is found to be a valuable fuel.

Coal.—About 1,000 tons of coal are kept in stock on board the hulks in Stanley harbor. There are eight lighters, but coaling is slow. Strong winds in summer, and snow squalls in winter, interrupt coaling. Small vessels can probably go alongside the hulks.

Repairs can be effected to both wood and iron vessels.

Communication.—There is monthly communication by the steamers of the Kosmos Company, between port Stanley and England, calling at Montevideo. Two small steamers trade between Stanley and the local ports.

Anchorage.—Stanley harbor is easy of access, snug and secure, but for large vessels the anchorage is somewhat confined, as the deep water space is only a narrow strip running east and west in the middle of the harbor.

A vessel drawing 10½ feet, can with an off anchor, lie securely alongside the hulk sunk at the end of the dockyard jetty. The least depth at low water springs, was 12 feet.

Deep draft vessels should anchor south of Navy point, in 4½ to 5 fathoms; others may approach nearer the town.

Sailing vessels bound round cape Horn should not enter Stanley harbor, as the wind which would be fair for them to sail would be foul for getting through the Narrows; they may anchor about ¼ mile outside the entrance, in 6 to 7 fathoms, at 600 yards from the shore, with William point just shut in; and from whence they can leave with any wind. But those coming from cape Horn may enter, as any wind which would be fair for them to sail, if bound to the northward, would also be fair to leave the harbor.

Tides.—It is high water, full and change, in port William and Stanley harbor at 5h. 15m.; springs rise 7 feet, neaps 5½ feet.

On the SE. coast of the Falkland islands there is so little tide that it need not be considered, though a current from ½ to one mile an hour will generally be found running with the wind; but after passing port Harriet a strong tide begins to be felt.

The flood runs to the NE., past the Wolf rock, and becomes stronger as it approaches cape Pembroke, round which its rate is from 2 to 3 miles, according to the age of the moon. The flood runs directly to the northward of the Seal rocks to Volunteer point, while very little tide is felt within the heads of port William or Berkeley sound. The ebb runs with equal strength to the southward, and when there is a strong breeze, a heavy tide rip extends 2 miles off shore.

Directions.—Approaching from the northward towards port William with a fair wind, after rounding Uranie rock, steer for the lighthouse on cape Pembroke; some white sandhills will then be seen ahead, and close to Kidney island; also the beacon on William point; at the same time the Seal rocks will be seen on the horizon just open off cape Pembroke. Pilots will be found ready to board vessels off the lighthouse.

Coming from the southward, with a flood tide it is necessary to guard against being swept too near cape Pembroke or the Seal rocks. With a commanding breeze, vessels have passed between the rocks and the cape, but it will be prudent to pass outside them. Should a vessel find that she is setting towards Seal rocks, the only alternative is to pass between them and the cape, as the tide sets through strongly; avoiding Billy rock 1,200 yards westward of Seal rocks. In passing cape Pembroke bound to the southward, the same rule applies as when bound into port William; and in light winds, or much swell on the ebb, it is better to pass well to the northward of Seal rocks, in order to allow for the tide running to the southward.

In coming from the southward in thick weather or at night, the lead will not be much guide, as Beauchêne island is on the southern edge of the bank which surrounds the Falkland islands; and the 100-fathom line only extends about 5 miles southward of it. After passing eastward of Beauchêne, a N. 39° E. (N. 25° E. mag.) course for 60 miles will clear all the islands off the SE. coast of East Falkland, making due allowance for current and the depth then will be from 60 to 70 fathoms, about 15 miles SE. of Lively island. If in daylight, and the weather be clear, the high land in the central chain will be seen a considerable distance, and a course may be steered near the coast, passing about 6 or 7 miles outside the eastern Sea Lion island, and the same distance from Shag rock (which shows high out of the water), and from Lively island. In either case after passing Lively island, a course should be steered towards the easternmost of the hills; if thick, or too dark to see the hills, a vessel will be in a very good position for waiting for daylight, and should endeavor to keep in soundings from 40 to 50 fathoms.

When the land can be made out, by bringing the eastern hill, mount Low, 840 feet high, to bear N. 13° E. (north mag.), and keeping it on that bearing will lead into the shore, where it can be approached in perfect safety, just south of the entrance to port Harriet. The Wolf rock and Cape Pembroke lighthouse will then be seen, and course may be shaped for port William. At night, Cape Pembroke light will be a guide. If the wind be off the land, a vessel might pass inside the Wolf; avoiding Maggie Elliot rock of 2¾ fathoms, distant 1¼ miles from the Wolf, about one mile off shore, and which may not break with the wind off the land. Without a commanding breeze, it is better to pass outside the Wolf.

Coming from the northward, with westerly winds, make cape Carysfort, or with easterly winds, Volunteer point; when they are passed, steer for Cape Pembroke lighthouse until port William opens out, when run in and anchor, or wait for a pilot. In case of darkness or fog, vessels may anchor in the mouth of Berkeley sound or of port William, or stand off and on, as may be expedient, there being no danger not marked by kelp.

Directions for Stanley harbor.—If the wind be southerly, the passage into Stanley harbor should not be attempted under sail, except by a small quick-working vessel; but with the wind to the westward of SW. it may be passed by all vessels; care is, however, required in rounding Tussac point, as shoal water extends from it 350 yards in a westerly direction. If the wind be SW., so as to make it very necessary to pass very close to Navy point to fetch through, a vessel should work well up to windward of the entrance, and entering the passage under all sail and with good way on, directly the sails lift from the wind drawing out in passing the point, she should be kept a little higher, so as to shoot through with the sails shaking till she gets the steady wind inside the point.

When through the Narrows, the harbor may be traversed by any vessel drawing under 20 feet; there are depths of 3½ fathoms at 200 yards from the kelp on each side, and about 4 fathoms in mid-channel, close up to the town on the south shore. Large vessels have plenty of room to round-to and anchor in mid-channel, in about 5 fathoms, as far up as they choose to fetch. After passing the Narrows the bottom is excellent, a stiff mud, which often causes some trouble in getting the anchor up again.

Caution.—A long steamer should proceed well into port William, or until the entrance to Stanley harbor is well open, and bearing S. 10° E. (S. 23° E. mag.) before steering toward it. And on leaving, when at the entrance, a N. 10° W. (N. 23° W. mag.) course should be steered until Yorke point opens, before altering course to the eastward.

Port Harriet, the entrance to which is about 5½ miles SW. of cape Pembroke, is formed on the south side of the ridge which separates it from Stanley harbor, the distance across being about 2¼ miles. Vessels working from the southward, intending to touch at port William, and finding a strong northerly breeze, and a high sea, or with night approaching, would find excellent anchorage in the entrance to port Harriet. Seal point, the south entrance point, is low, and has a round low mound off its extremity, to which it is joined by rocks; off this mound a ledge extends about ½ mile to the eastward, but kelp marks its extent.

Outer anchorage.—There is anchorage in 6 to 7 fathoms, just outside a small kelp patch of 3 fathoms, lying nearly in mid-channel; or to the westward of it, in 3½ to 4 fathoms. From here supplies could be obtained from the settlement in Stanley harbor while waiting for a fair wind. There is a good stream of fresh water in a cove on the north side, about a mile inside the entrance.

The only wind that would raise any sea in the entrance would be from ENE. to SE., which seldom blows; and should it rise from that quarter and be too strong to work against, by running in over the bar a secure anchorage may be found, quite sheltered.

Bar.—At about ½ mile within the kelp patch a bar extends across from Lake point (off which there is a small detached rock) to the south shore, about one mile within Seal point. The deepest water on the bar is 3 fathoms, fine sand, in mid-channel, and shoaling gradually to 2 fathoms, close to the kelp on each side. It suddenly deepens on its inner edge from 4 to 7 fathoms, the bottom changing from fine sand to mud. No marks are necessary for passing over the bar, the above description being sufficient. The harbor is of no importance except as a good stopping place for a vessel failing to reach her port before night.

Harbor.—After passing the bar, port Harriet affords excellent anchorage for an extent of 3 miles, the breadth being nearly ¾ mile.

All the dangers are marked by kelp, except in one place about halfway up the harbor, where a sandbank, without kelp, extends about 200 yards off the south shore. The best anchorage is in mid-channel, in order to have plenty of room for getting under way if the wind should be blowing strong off either shore; the depth varies from 5 to 8 fathoms, the bottom soft black mud.

The head of the harbor is terminated by a creek which runs about 2 miles to the westward.

Tides.—There is scarcely any tide felt in port Harriet. It is high water, full and change, at 5h. 0m. p. m., the springs rise 6 feet.

Port Fitz Roy.—The coast between port Harriet and port Fitz Roy, 9 miles westward, is bold, rocky, and nearly straight, except about halfway where there is a small bight with a white beach open to the eastward. From port Harriet to Beach point there is no danger outside the kelp that fringes the shore; but between this point and East island, which forms the south entrance point of port Fitz Roy, there are numerous kelp patches. From Beach point the coast trends westward for 4 miles, terminating in a bay, the south horn of which is Bold point, the north entrance point to port Fitz Roy. This bay is opened to the eastward, and in the middle of it there is a rock dry at low water, and surrounded by kelp. At the north side of the bay is a narrow inlet, leading to North basin, and passing through a gorge in the ridge of low hills; the depth in the narrow part is about one fathom. The basin is one mile long and very shallow.

A bar extends across the entrance of port Fitz Roy, from the west end of East island; the deepest water is close to the south edge of the kelp patch on the north side of the bar, where there is a depth of 3 fathoms, gradually shoaling to 2 fathoms close to the kelp off East island; to the northward of the kelp patch there is a narrow passage with 2½ fathoms, but it can only be passed through with a fair wind.

Anchorage.—For 3 miles above the bar the port is fully a mile wide, and quite clear of danger to within 400 yards of the shore, and to near that distance the kelp extends. This wide part affords excellent anchorage; the depth varies from 4 to 6 fathoms, and the bottom is mud. Off White point, on the north shore, a sand spit, without kelp, and with less than a fathom of water, extends off about 400 yards; it is easily seen, as the water looks quite white.

East road.—Between the west end of East island and the point of the mainland forming the south shore of the port are several small islets, between which there is a deep, but narrow and winding channel into the port. The channel is well marked by kelp, and the depth of water in it varies from 4½ to 7 fathoms; some rocks nearly awash lie very close inside the kelp edge, on both sides of the channel.

A large vessel, however, should not attempt the channel into port Fitz Roy through East road, unless the wind be between south and east; or to come out, unless between north and west, as nothing but a small craft could work through it, and in some parts it is too narrow to bring up a large vessel. The middle part of the channel opens out to about ⅓ mile in breadth, and forms a nice anchorage for small vessels.

Fitz basin.—On the north shore of the port there is a remarkable gorge in the ridge of low hills, through which a narrow inlet runs for about ½ mile, with a depth of 1½ to 2 fathoms; it then opens out into Fitz basin, large and shallow, like that of North basin. Westward of the basin is Fitz cove.

Head of the port.—About 3 miles inside the bar the port is divided into two arms by a peninsula and Tussac island. The southern arm, about 1½ miles in length, is very shallow, and nearly all covered with kelp, except close to Tussac island, where there is a small patch of clear ground with 2 fathoms water.

To the northward of Tussac island, and directly in the middle of the entrance to the northern or main arm, there is a large patch of kelp, with only 6 feet on it. On the north side of this patch there is a channel ¼ mile wide, with 3½ fathoms water for about a mile; and about one mile beyond will be found the best anchorage for small vessels, in 2½ fathoms soft mud, abreast Garden point, on the north shore, where the arm turns to the northward. Off Garden point and the point on the opposite shore some rocks dry at low water, but the kelp extends well outside them, leaving a passage in mid-channel nearly 400 yards wide; the arm then opens into a broad space, but all shallow, except in the channel, which is about 200 yards wide, with a depth of 2 to 3 fathoms.

On the north side of this open space there is a narrow opening, through which the channel runs to its eastern shore, and so steep-to that vessels may lie alongside the rocks in 4 fathoms, which would only requiring leveling to make excellent wharves; but the channel is hardly wide enough for swinging a long vessel, the opposite side being low, with rocks lying some yards from the shore. Inside this passage it opens out again to a wide creek, which runs above 2 miles to the westward, and ends in a small fresh-water river. Much of this upper space is dry at low water, so that a boat can not get within a mile of the river. There is good anchorage for small vessels for ½ mile inside the narrows, in 2 and 3 fathoms, muddy bottom.

Tides.—There is scarcely any tide to be felt in port Fitz Roy, except through East Road entrance, where it runs about 1½ miles an hour; in the narrows near the head it is rather stronger. It is high water, full and change, at 4h. 45m.; springs rise 6 feet.

Directions.—It is difficult to make out the entrance to ports Fitz Roy and Pleasant when standing in direct from seaward, as the land round them is low, and the points can not be made out distinctly till close-to. The best guide is the high range of hills north of port Fitz Roy, with three peaks near each other, the middle one showing a broad, flat summit. The westernmost and highest of these, mount Kent, 1,535 feet high, bearing N. 20° W. (N. 33° W. mag.), will lead directly to the entrance of port Pleasant, and clear of the large kelp field south of Pleasant road. The same hill bearing N. 52° W. (N. 65° W. mag.) will lead direct to the end of the kelp off East island, and when near the kelp will guide into either channel of port Fitz Roy.

The best course into port Fitz Roy, coming from the eastward, is to the northward of all the kelp patches between Beach and Bold points, keeping close to the kelp on the main shore, where the passage is, in the narrowest place, above ¼ mile wide; but if the wind be blowing hard from the southward, it would be advisable to keep to the southward of all the kelp patches, and run for the large kelp patch that extends above a mile off the east end of East island. Following the inner edge of this kelp patch will lead direct into port Fitz Roy; but when abreast of the island, keep towards the north shore, passing just south of the large kelp patch which lies NW. of the bar and between the two channels.

Port Pleasant, which is immediately south of port Fitz Roy, has two entrances, formed by Pleasant isle, a long narrow island, with some small islets. These islets are surrounded by a large and thick kelp patch 2 miles in length, the edges of which are the best guides into both entrances. Off Pleasant point, the south entrance point, a kelp patch extends above a mile to the eastward, with rocks which break heavily with southerly gales.

Bars.—Each channel into this port has a bar across the entrance. The bar in the north channel is abreast the second of the small islets; the bar in the south one is a little inside the east end of Pleasant isle; the deepest water on both is 2½ fathoms, but vessels drawing 17 feet might enter with a leading wind during the last quarter flood. The north bar carries its 2½ fathoms right across to the kelp on each side; but the south bar has only 2½ fathoms close to the island kelp, and thence it shoals to 1½ fathoms on the south shore. The north channel is therefore the best for large sailing vessels; but they must have a fair wind, as a little above the bar the channel is contracted to about 100 yards by one of the small islets; but there is a depth of 8 fathoms water there, quite steep-to on both sides. Inside this, the harbor expands to about ¾ mile, and continues that breadth till it is joined by the south channel, round the west end of Pleasant isle; the bottom in all this space is soft mud, the depth varying from 10 to 6 fathoms.

After passing the bar at the south entrance, the depth will be 4 fathoms to where it joins the north channel; but about a mile inside the bar, off a remarkable white sand patch on the south shore, there is a low projecting patch of rocks, nearly covered at high water, from which a sand-bank extends, with less than one fathom. The water over the bank is quite white, and it may easily be seen; but the best way is to keep the island kelp close aboard when entering by the south channel, and directly the vessel has passed the west end of the island stand over to the northwestward, as along the south shore there is a shallow bank.

Island harbor.—At the head of port Pleasant, beyond Turn point, there is a narrow opening to a large inlet, which winds through the hills for about 3 miles to the SW., and then leads into Island harbor. For the first mile the inlet is about ⅓ mile wide; it then opens out to a space about ¾ mile each way; the deep channel runs close to the south shore of this space, and then turns to the southward, into the narrow part of the inlet, which for 2 miles is scarcely 100 yards across. There are depths of 4 and 5 fathoms in the channel, and though it occasionally crosses from side to side, no small vessel would find any difficulty in sailing through with a fair wind. Island harbor is nearly all shallow, but there is space for small vessels to moor in 2 to 3 fathoms. A mile from the head it is nearly dry at low water.

The shores of port Pleasant are the favorite resorts of numerous herds of cattle, perhaps in consequence of its freshwater lakes, on the banks of which a short, rich grass grows.

Tides.—The tide in both entrances of port Pleasant runs nearly a mile an hour at springs, and in the narrow pass of the north entrance nearly 2 miles. It is high water, full and change, at 5h. 0m.; springs rise 6½ feet.

Pleasant road, immediately to the southward of port Pleasant, is well sheltered from the southward and southeastward by a bed of kelp, which extends 3 miles off shore, and is 3 miles wide; in this kelp are three small islands about a mile off shore. The road is exposed to NE. gales, but they are not frequent, and the holding ground is good, being sand with a stiff clay under it.

Kelp lagoon is a shallow piece of water SW. of Pleasant road. It is about 3½ miles long, from one to 2 miles wide, has several islands in it, and two entrances; but both of them are blocked up by kelp, which extends nearly 2 miles off shore, and is a continuation of the large kelp patch south of Pleasant road.

Choiseul sound is 26 miles in extent from east to west, 3½ miles across at the entrance, between Fox point and Lively island, and gradually becomes narrower towards its head. In the western corner is a long and narrow inlet named Bodie creek, which extends about 4 miles to the westward and varying in breadth from ¼ mile to 100 yards.

The whole of Choiseul sound is studded with islands, which form well-sheltered anchorage for small vessels; there are also numerous creeks and coves, in many of which they may lie securely. Large vessels can bring up in almost any part of the sound in 12 to 18 fathoms of water; the bottom is mud, but generally covered with shell and weed, which give it, on the arming of the lead, the appearance of a rocky bottom, but all the rocky dangers are marked by kelp. The shores of the sound are all low and intersected by numerous ravines with small streams in them, but many of these are dry in the middle of summer, particularly to the southward of the sound.

Fox point, about 9 miles SW. of Pleasant road, forms the north point of entrance to Choiseul sound, which is best known coming from the eastward by the long, white, sandy beach to the NE., with a small, dark islet (Direction islet) that shows plainly on the white ground behind. Fox point is the southern extremity of this long beach, with a small islet off it and kelp extending about 2 miles farther to the eastward. The entrance between the mainland and Phillimore island is 3 miles wide, divided into 2 channels by Middle island, which lies nearly one mile off Phillimore island. A long kelp patch runs 2 miles eastward from Middle island, and on it are two small islets with a large black rock near its outer extremity. The best channel into the sound is northward of Middle island, between it and the two Black rocks, which are several feet above water, and lie about ½ mile off the north shore, with a long tail of kelp to the eastward. There is a passage with 3½ fathoms between the rocks and the shore, but only small vessels can work through it. The channel between Middle Island rocks and Black rocks is about one mile wide and clear of all danger, except 2 or 3 small patches of kelp inside, which are easily seen. The channel between Middle and Phillimore islands is deep and ¾ mile wide, but full of large kelp patches. Westward of Middle island the south channel is divided by Green island.

Mare harbor.—After passing the Black rocks, in the north channel to Choiseul sound, the first opening in the north shore leads into Mare harbor, one of the finest on the coast, and easy of approach for the largest vessels. The entrance is 1½ miles wide, but the kelp extends a long way off the western side, from Seal island, contracting the channel to less than ½ mile; but inside it opens into a clear piece of water, about 1½ miles long and one mile wide, with excellent anchorage in 6 to 10 fathoms, muddy bottom.

East and West coves.—On the east side of Mare harbor an opening about 400 yards wide leads to East cove, another very fine harbor, and the best for a vessel that intends to remain a long time; but with westerly winds a large vessel could not work out. It is about ¾ mile wide, and its east end terminates in two coves, with sufficient water for small vessels.

On the western side of Mare harbor there are also two coves; one of them, West cove, is nearly 3 miles long, and for nearly 2 miles affords good anchorage for small vessels, in 3 fathoms water.

Swan inlet stretches 7 miles to the northward from the northern side of Mare harbor, and terminates in a small river. For 5½ miles this narrow inlet has a depth of one to 2 fathoms; it then opens into a wider space, and becomes so shallow that a boat can not go higher at low water. In some parts of the inlet the shores are so steep that a vessel may lie alongside the rocks. Water can be found in most of the hollows, but the smaller streams are dry in the middle of summer.

Victoria harbor.—On the south side of Choiseul sound, about 12 miles west of the entrance, is Victoria harbor. It is formed by a peninsula, 7 miles in length, extending to the eastward parallel to the shore; the first 4 miles of which has good anchorage for large vessels, in 5 to 10 fathoms. Off the entrance there are two clusters of islands, between which and the shore there is also excellent anchorage.

John point.—The bottom of the bay close westward of John point, on the north shore, is rocky, which renders it an unsafe anchorage.

Darwin harbor.—In the NW. corner of Choiseul sound there is also a good harbor, but the entrance, which lies between two large clusters of islands and Squib point, is narrow.

Vessels in entering Darwin harbor follow the curve of the kelp and islets forming the west side of the narrows, until abreast Squib point, when they should borrow on the eastern shore before turning into the anchorage, to avoid the shoal ground and kelp extending from the NE. side of the island on the west side of the channel.

The kelp and rocky ground of less than 3 fathoms extends SE. about ½ mile from Squib point.

Hare island.—Kelp extends for a distance of 300 yards from the NW. side of Hare island. The island is the nursery for hares.

Settlement.—In Darwin harbor, at about one mile northward of Teal creek, on the south side of a bay on the western shore, is the settlement, of about 15 houses.

Arrow harbor.—To the southward of Darwin Harbor entrance there is another good anchorage in Arrow harbor, southward of Arrow island, in from 4 to 5 fathoms.

Tides.—It is high water, full and change, at Mare harbor, Choiseul sound, at 6h. 0m., springs rise 6 feet; the tides run nearly a mile an hour at the entrance.

There is but little tide in Choiseul sound, except in the entrances to creeks and between the islands. In the south entrance to the sound, also, both ebb and flood are strong; at springs about 1½ miles, and when blowing hard they cause a ripple off Pyramid point, which is dangerous for a boat. The flood sets to the northward in this entrance, but in the north entrance there is scarcely any tide, and the little flood there is runs to the eastward out of the sound.

Lively island and sound.—Lively island, lying off the entrance of Choiseul sound, is 6 miles long by 5 miles broad; reefs, with passages between, extend 4 miles off its NE. point; also reefs extend from the SE. and SW. points. Southwestward of Lively island there is good temporary anchorage on the west side of Lively sound, to the northward of Motley island. Kelp extends ½ mile southwestward of Motley island. Any vessel bound to the westward, and not able to reach Bull road before dark, would find this the best anchorage; but if it should be blowing hard from the southward or SE., a heavy swell would set into Lively sound. In which case it is safe to run up the sound, taking care to avoid the shoal extending 1½ miles westward of

Sel point and the shoal off Seal island; and either haul to the westward into Seal cove, or pass farther on, and anchor on the north side of Pyramid point, in Pyramid cove, where there is good anchorage, in from 5 to 8 fathoms, sandy bottom, with a stiff clay beneath.

Kelp bay.—Good anchorage is also to be found in Kelp bay, on the NW. side of Lively island, in 8 fathoms, broken shell, with an under surface of mud; with the west extremes of Phillimore (main) island and Reef island, N. 2° E. (N. 11° W. mag.) and north end of Kidney island, S. 81° W. (S. 68° W. mag.).

Seal cove.—For vessels going to remain any time there is no spot superior to Seal cove. It is sheltered from every wind, the land round it is very good, particularly in the valley between it and Low bay, and it is well watered. There are large rivulets running into the head of the cove and several small streams on the north shore close to where vessels would anchor. There is deep water close round the kelp, on the north side of Seal island, and though long kelp reefs project from it there is plenty of room.

Low bay has its entrance between the north point of Bleaker island and the rocky Triste islands, on the opposite shore, 3 miles apart, inside which the bay expands to a breadth of 8 or 9 miles, with depths of 15 to 22 fathoms.

This bay is indented with several bights and bays, and although inviting in appearance they are not advisable anchorages, as the ground is rocky and foul in many parts and a heavy swell rolls in with southerly gales. There is no danger in it, except a patch of rocks, dry at low water and fringed with kelp, lying on the western shore midway between Bluff head and Turn island. Bluff head may be easily recognized, being a dark bluff cliff of 60 feet in height and the most conspicuous object in the bay, with a small islet close to it. The character of the land in this part of East Falkland and to the southward is low, few places being of greater elevation than 150 feet.

Tides.—It is high water, full and change, in Low bay at 5h.; springs rise 5½ feet; the rate of the tide at the entrance is about one mile an hour.

Shag rock, lying about 5 miles off the entrance to Low bay, is an excellent guide when running from the southward for either Lively sound or Adventure sound. It is a high peaked mass which can be seen 5 or 6 miles, and there is no other island that resembles it; while the low land is all so much alike that it is almost impossible for a stranger to recognize his landfall, particularly as the high range of hills is seldom seen so far south; but the Sea Lion islands or the Shag rock being made out the chart will show the bearings of the points.

Bleaker island is a long, low, narrow island, lying at the entrance of Adventure sound. A bay on its NE. side, north of Sandy Bay island, forms the most convenient stopping place between Lively sound and Bull road; the water in it is deep, and the vessel has to work close to its head to get as little as 12 fathoms, but she is then well sheltered from almost every wind. The anchorages are very good inside Bleaker island, but as there is no passage out between the SW. end of the island and Driftwood point, they are not convenient for vessels bound to the westward.

Between the north end of Bleaker and North Point island there is a passage for small vessels with depths of 5 or 6 fathoms. At 3 miles south from North Point island is Halt island, with a long kelp spit running off to the northward, but affording for small vessels a fair anchorage inside it, in 6 or 7 fathoms, over a bottom of stiff mud. There are no other anchorages around Bleaker island. To the southwestward long spits run off the points of the island, and there are several kelp patches, but the water is deep between and around them. There are ponds of fresh water on the island, quantities of wild fowl, and heath fuel.

Adventure sound is about 20 miles in length from Bleaker island to its NW. extremity, and its general breadth between 3 and 4 miles. It contains several good harbors and various creeks and coves; those on its SW. side are to be preferred, being sheltered from the prevailing winds. It has several islands, and its shores are fringed with kelp. The two best harbors are in the southern part of the sound; the principal one, Adventure harbor, the other Moffit bay, 1½ miles to the southward of it. Barrow, Fox, and Sullivan harbors lie northwestward of these. The creek and coves on the NE. side of the sound are only fit for boats and small vessels.

Adventure harbor.—This fine harbor is fit for vessels of any class; and excellent fresh water may be obtained from the ponds, which are frequented by quantities of wild fowl. In proceeding to it, having rounded Bleaker and North Point island, a S. 69° W. (S. 56° W. mag.) course 4 miles will lead to abreast Little island, which is a small dark-looking mound of tussac; from thence, a S. 53° W. (S. 40° W. mag.) course, nearly 3½ miles more, will lead to the entrance of the harbor, which is clear of all danger, and in which a good berth may be taken in from 5 to 12 fathoms, stiff mud. A lookout must be kept in going up the sound for a kelp patch, lying S. 15° E. (S. 28° E. mag.), distant 1¼ miles from Little island, and about the same distance from the Sisters; there is, however, plenty of water close to the kelp.

Fuel may be had here for daily use in the dry season by gathering the heath, the resinous qualities of which cause it to emit a very powerful heat, and it cooks excellently. Driftwood also may be procured from the seacoast, but it lies at a great distance, and requires much time and labor to collect.

Moffit bay lies 2 miles southward of Adventure bay, and has depths of 7 to 10 fathoms. This bay is not so easy of access as Adventure bay.

Barrow harbor lies about 3 miles northwestward of Adventure bay. If proceeding for this harbor, after having passed Turn and Large islands, which have deep water close to them, little direction is necessary, as no danger exists in the passage. Steer to pass close north of Kelp island, which is steep-to on the northern side. On gaining the harbor a berth may be taken in any depth of water from 4 to 10 fathoms, good bottom. For small vessels either of the arms will be found equally convenient. Good water and fish may be procured here as plentifully as in Adventure harbor.

Fox harbor, the next anchorage to the northward of Barrow harbor, is not so desirable, as it has less water, and there are some shoals; it is, however, a good place for small craft, and fish abound in its creeks from November to February.

Great island lies off the north point of entrance to Fox harbor, and from its north point a rocky spit extends ½ mile to the northward, partly dry at low water, with 4 fathoms close to the kelp. Between the island and Low point there is a passage for boats and small craft, with 3 fathoms water. The shore from thence to the Promontory, east side of Sullivan harbor entrance, is only fit for small vessels to navigate, several kelp patches lying off it. A patch of kelp, with 5 and 6 fathoms close to its edge, lies nearly ½ mile S. 43° E. (S. 56° E. mag.) from Great island, and also a small round island, named the Button, eastward of Great island; there is, however, deep water between them, but the passage is narrow.

Vessels proceeding to the upper part of Adventure sound, after passing Turn island and Shell point, must keep a lookout for a small kelp patch nearly midway between Shell and Button islands, and distant from the former rather more than a mile. Then, passing ¼ mile to the northeastward of Great Island spit, a N. 55° W. (N. 68° W. mag.) course for 3 miles will lead between Promontory and Saturday points.

Sullivan harbor has a good anchorage, with depths of 3 to 6 fathoms, muddy bottom. Up the creeks and arms there is an abundance of fish, wild fowl, and good water.

West arm.—Small vessels may proceed up the west arm, by keeping close to the north shore when abreast the little spit that extends from the opposite side; the passage there is very narrow and the tide runs out strong, but there is plenty of water. Small craft may also anchor inside North island.

Tides.—It is high water, full and change, in Adventure sound, at 5h. 30m.; springs rise 5½ feet. With the exception of the narrow passage in the West arm, the tides are very weak.

Sea Lion islands consist of one large and three small islands lying 10 miles southward of Bleaker island. They extend in an east and west direction about 10 miles; and distant 3½ miles N. 75° E. (N. 62° E. mag.) from the eastern islet is an outlying reef. There is a safe passage between the islands just eastward of the large one; but a long reef which breaks heavily extends 3 miles to the southward of that island, for which a good lookout must be kept, in running for the opening.

Beauchêne island, the summit of which is in latitude 52° 54′ S., longitude 59° 12′ W., is about 2 miles long and ½ mile across. Its northern point rises to a green mound 271 feet high; the southern end is less than half that height, and is all rocky; the south and east sides form high cliffs, but the west side slopes gradually to the sea. There is no known danger beyond ¼ mile off shore.

Mintay rock.—A sunken rock is said to exist 3½ miles S. 47° W. (S. 34° W. mag.) from the south extreme of Beauchêne island; care should therefore be exercised when passing to the southward of the island.

Directions.—Vessels from the southward, bound to Stanley harbor, should make Beauchêne island. If wishing to get into a port before dark, they should endeavor to make the west end of the Sea Lion islands in order to haul up for Bull road; or, if daylight allow, by making the Shag rock they may run for Lively or Choiseul sound.

Bay of Harbors, situated westward of Bleaker island and Driftwood point, extends 15 miles in a NW. direction, contracting to 1¾ miles between West and Cattle points. Nearly midway, in the entrance, and N. 36° E. (N. 23° E. mag.), 4 miles from Bull point, is Middle shoal, with a rock awash at low water.

Bull road, in the SW. part of Bay of Harbors, is by far the most convenient anchorage in the southern part of East Falkland. Large vessels can work into it, and by anchoring close to the shore, on the south side of the road, off the entrance of Bull cove, the large kelp reefs on the north side of the point will completely shelter them from easterly winds. The bottom is good, in from 7 to 10 fathoms. Except during a very dry summer, there is fresh water in all the bights on the south side of the road, but the best watering-place is in a cove on the western side, off which there is good anchorage.

In approaching Bull road, care must be taken to avoid the kelp patches, indicating shoal water, 1½ miles southeastward of Porpoise point; also the kelp patches extending one mile eastward from Bull point and Porpoise island. By following the edge of the kelp to the NW. it will lead into the road. The chart and the kelp will be the best guides in this, as in every part of the Falklands.

Fanny road is the only other advisable anchorage to the southward of West point. It is formed by the Fanny islands and West point, and shows three beaches of white sand; and is secure, with a good depth of water over a bottom of sand and mud. No direction is necesary beyond a lookout to be kept for a small kelp patch, which lies ½ mile northeastward of Fanny islands.

Large vessels bound up the bay, with a leading wind, should keep a mid-channel course between Cow point and Little Harbor island, to clear the kelp spit, which extends southward from Kelp island. A course N. 49° W. (N. 62° W. mag.) for 5 miles will lead past West and Cattle points, and clear of three kelp patches which lie NW. 1½ miles from West point.

Snug cove.—Northwestward of West point there is good anchorage for large vessels westward of the three kelp patches, and southward from the cliffy point forming Snug cove, in depths of from 8 to 15 fathoms; the bottom is mud and sand, and it is advisable to moor.

North and Northwest arms, and the several creeks, present for vessels of moderate tonnage secure and snug berths; the only direction necessary for them is to look out for the kelp running off the points and islands, and which is generally bold-to. Here, as in Adventure sound, the hills seldom exceed 150 or 180 in height, and are of an uniform appearance. Fish and water are procurable.

Tides.—It is high water, full and change, in the Bay of Harbors at 6h., springs rise 5 feet, with little or no velocity.

The tide sets to the westward during the flood along the whole south shore of East Falkland; its strength is from one to 2 miles an hour, but near Porpoise point, the SW. horn of the Bay of Harbors, it is nearly 3 miles, and with westerly gales forms a strong race. The stream turns when it is high water by the shore.

Eagle passage, situated between the SW. end of East Falkland and Speedwell, George, and Barren islands, is not recommended for large vessels, as there is a tide of 3 miles an hour, with races in the narrow parts. Vessels in passing through may go on either side of the kelp patch which lies 1½ miles westward of Blind island. The only other obstruction in the passage is Mid island, with its reefs marked by kelp, extending ¾ mile NNW. and eastward from the island. The sea breaks heavily on them in bad weather, as it does on all the coast from Porpoise point to Mid island, after passing which the channel becomes narrow but clear of danger.

Barren and George islands.—Owen road.—Of the group of islands that form Eagle passage, Barren and George islands are the southernmost, and between them there is good anchorage for any kind of vessel, in Owen road. But in coming from the southward, to enter Eagle passage, care must be taken not to pass nearer to Barren island than 3 miles, as the two Barren reefs extend off fully 2 miles in a northeasterly direction, and at 3 miles distance S. 55° E. (S. 68° E. mag.) from the center of the island there is kelp and foul gound. From the western point of George island a reef runs off abouc 3 miles to the southwestward, with kelp extending 2 miles farther in the same direction.

The south channel from Owen road, between George and Barren islands, having been partially examined, is reported to be good, the least water obtained in passing through was 4 fathoms.

Directions.—Vessels entering Eagle passage from the southward should not haul up for the anchorage in Owen road until the passage between Barren and George island is open, or until the north point of Barren island bears S. 41° W. (S. 28° W. mag.) and the north point of George island N. 71° W. (N. 84° W. mag.), then a S. 58° W. (S. 45°

W. mag.) course will lead to the anchorage. There is a kelp-covered reef, half way between the eastern points of George island and Barren reefs; the passage recommended, which lies to the southward of it, is more than a mile wide and quite clear.

With a SW. gale, a vessel may work in to Owen road, as the water is quite smooth; and with a SE. gale, which causes the heaviest sea on the coast, she will ride in smooth water, if the NE. part of Barren island bears northward of S. 77° E. (east mag.). A good position is in from 8 to 10 fathoms, close off George island; the bottom is chiefly stiff clay, covered with a crust of broken shell. Straggling stems of kelp will be seen, but they are of no consequence. Large vessels should anchor before shutting in the points of the southern passage. These islands are well supplied with water from many lakes; the largest is on George island, and is nearly a mile in extent.

Speedwell island, to the northward of George island, is the largest of the group, being 9 miles long and about 3 miles broad; it is low and flat, about 70 feet high and visible about 9 miles. Pigs, geese, snipe, and rabbits are plentiful on the island, and abundance of driftwood on the western shores.

Halfway cove.—Speedwell island has two good anchorages for small vessels on its northeastern side, where fresh water is procurable. Halfway cove, the first of these anchorages, lies immediately to the southward of a small rocky islet; but it is small and requires quickness in coming to an anchor. There is kelp on both sides, but not less than 5 or 6 fathoms water on its edge; the holding ground is excellent, and the depth from 5 to 8 fathoms. The second or northernmost anchorage is about a mile within the north point of the island in the first sandy bay seen, when standing along the island to the southward. Care is necessary when approaching this anchorage from the northward, as shoal water extends about ½ mile from the NE. part of Speedwell island.

Between George and Speedwell islands there is a passage for small vessels, but it requires a good pilot, as there are some rocks in it. It is sometimes used by small craft in running for the southern anchorage of Speedwell island. In making for either of the anchorages on the northeastern side of Speedwell, from the northward, keep about 2 miles to the northeastward of Elephant cays, and well clear the kelp off the islet between them and Speedwell.

Elephant cays, lying off the NW. end of Speedwell island, are low sandy islets, surrounded by reefs and kelp; there is no known passage between them and Speedwell. Kelp extends nearly 3 miles NNW. of the cays, and depths of 6 to 7 fathoms were obtained 2 miles northwestward; a spot which occasionally breaks, marked by kelp, lies one mile SW. of Elephant cays. A wide berth should be given to them.

Tides.—It is high water, full and change, in Eagle passage, at 8h., and the rise and fall is 4 feet; the flood setting through to the northward, and the ebb to the southward, at a velocity of from 2 to 3 miles an hour, but greatly influenced by the winds.

CHAPTER XIV.

FALKLAND ISLANDS.—FALKLAND SOUND.—WEST FALKLAND.

Falkland sound, which separates the two main islands of East and West Falkland from each other, extends 45 miles in a northeasterly and southwesterly direction, and varies in breadth from 13 to 2½ miles. At its southern end there are many flat islands and some shoals; the dangers are, however, generally visible. The water being always smooth, and thick weather seldom occurring, its navigation is rendered easy; it ought not, however, to be navigated at night; and as good anchorages may be obtained in almost any part of it, a safe position may always be selected before dark.

The eastern side of the sound, after passing the Northwest islets and Grantham sound from the northward, changes its aspect to a low country, with gently undulating hills, which seldom exceed 150 feet in height, and it maintains this character to the southern extremity of the sound. Its shore is indented with excellent harbors and creeks, affording good shelter in all weathers, and fronted with flat islands, particularly at the SE. part.

The western side, on the contrary, is high and bold, forming a singular ridge, varying from 300 to 600 feet, nearly the whole length of the sound, but reft asunder in places, and thus forming harbors. From Bold point northward it is a continuous ridge, lowering gradually to White Rock bay, separated midway by the entrance to Manybranch harbor. These gaps or fissures in the southern portion of the sound form excellent guides to the opposite harbors and islands on the flat side of the sound by determining their position by bearings from them. Immediately behind this ridge, Hornby mountains extend in a parallel line as far as Hill gap, from whence they take a westerly direction, ranging from 1,800 to 2,000 feet in height.

The ports in Falkland sound need but few written directions, as the shoals are all buoyed by kelp. The chart is the best guide. The harbors on East Falkland will be first described, beginning from the north.

Foul and Middle bays, at the northern entrance to the sound, are lee-shore bays, and therefore offer no inducements as anchorage places.

Port San Carlos being large, secure, and free from all dangers, is one of the finest harbors in the Falklands. Anchorage may be had either in the bay formed by the long tussac islands or in the south or east arm. The San Carlos river is navigable for small vessels 3 or 4 miles up and for boats about 6 miles. Just inside the Narrows, on the north shore, there is an excellent cove for beaching a vessel and examining her bottom. Fish are abundant and heath fuel may be had.

Port Sussex is a good harbor for small vessels; the best berth is round the flat stony point about one mile up on the southern side, in 4 to 5 fathoms, stiff mud. There is a small kelp patch at the entrance, with 4 fathoms water over it; the kelp off the east point must be avoided. Keep near the west point in entering or leaving.

Brenton loch has a very narrow entrance and strong tidal currents in it; it is therefore only fit for small vessels and boats. Its navigation is impeded by several rocks and shoals, but it is well sheltered, affords a water communication of 9 miles in length from the center of the island to the sea, and is separated from the head of Choiseul sound by a narrow neck of land not more than a mile in breadth.

New Haven is a small port well suited for moderate-sized vessels, with good anchorage in 6 to 4 fathoms, with a bottom of stiff clay under a surface of sand. Anchor rather on the western shore, near a small cove about a mile from the outer point.

Cygnet, King, Wharton, and Findley harbors are situated inside the Tyssen islands. All are excellent and secure, particularly the three latter, having no shoals in them of any consequence. Cygnet harbor has several small kelp patches, which makes it a little inconvenient for large vessels to work in, but it is a fine place for small vessels.

On the east side of Great island there is a good berth in 12 to 15 fathoms; it is a good starting place for vessels bound to the southward.

Ruggles bay lies abreast the Calista islands, and the passage to it is between Ruggles and Wolf islands. Good anchorage may be obtained in Danson and Moffit harbors, and which are clear of danger.

THE WESTERN SHORE OF FALKLAND SOUND.

White Rock bay is an excellent port and can be entered or left with any wind, but care must be taken to avoid the rocks off the entrance. Entering it from the northward, with a foul wind work up on the eastern shore of the sound, near Race point, until Tide rock in the center of the passage is weathered, and then stand across into the bay. When leaving the bay, bound to the northward and with a northerly wind, stand across and work out on the east shore, passing on either side of Tide rock, in order to keep clear of the Sunk rock and the rock awash off White Rock point. The kelp surrounding this rock only shows at slack water, being run under by the currents. With a fair wind a vessel may run in or out close past the large white rock at the end of White Rock point. Whether bound through the sound or into this bay, should a vessel have to wait outside for a change of tide stream to enable her to work to destination, it is advisable to keep a little to the westward of the entrance, under easy sail, where there is scarcely any stream.

Manybranch harbor, in consequence of its narrow and crooked entrance between the high heads, can only be sailed into by fore-and-aft vessels; large square-rigged vessels must resort to warping or towing, and that, too, in the morning or evening, when the wind is generally moderate. When once inside, it is an excellent harbor.

Port Howard has also a narrow entrance, but the harbor opens out just inside the heads. With a wind south of west by keeping close round the south head a vessel would shoot well inside. With a northerly wind a square-rigged vessel would scarcely succeed in getting through; as there is good anchorage outside in 11 to 12 fathoms, she should wait there for the morning or evening calms. It is a narrow harbor, but very secure, with plenty of good fresh water, fish, and wild fowl. The best berth is just inside the heads, in 4 to 5 fathoms water. Williwaws are very strong, with winds off the western shore.

There is a station established here for boiling down oil, with a small pier abreast it. A shoal of 14 feet extends off from the pier to about one-third the distance across the harbor.

Shag harbor is suitable only for small vessels; the gusts of wind down the ravine are very violent, but the holding ground is excellent. There is a very good berth between West Swan island and West Falkland, but it must be entered from the northward, as there is a reef of rock and kelp stretching across from the southern end to a small bight in the western shore.

Fox bay is exposed to the heavy seas from the southward, but should a vessel be caught there by a gale from that quarter she will find shelter in the North arm, which is quite secure and where there is a settlement. The passage leading to it is between the kelp, making out off the south end of Kelp point, and a ledge of rocks and kelp fringing the opposite shore, on which there is an islet named Knob islet; the anchorage is in 3 to 4 fathoms, stiff mud, with the first flat islet inside the narrows bearing south (S. 13° E. mag.) or S. 11° W. (S. 2° E. mag.) distant about ½ mile. This inner harbor is small and not easily reached by square-rigged vessels except with a fair wind.

Tides.—It is high water, full and change, on the shore at Race point, at the northern entrance of Falkland sound, at 6h. 45m.; the velocity of the tide here is about 4 miles an hour, but in Grantham sound its rate diminishes to about 1½ miles. At the southern entrance of the sound it is high water, full and change, at 7h.

The tides in both entrances of the sound, and between the islands, run from 3 to 5 knots at springs, but in the wider portions they are moderate. The stream of tide at the north entrance makes into the sound about 3 hours before high water on the shore, or about 4 hours at full and change. Among the islands in the southeastern part of the sound the tides are very irregular in their set and velocity.

There appears to be tide and half tide all through Falkland sound. The flood stream commences by running to the northward when it is half ebb by the shore, and runs until half flood; it then turns and runs to the southward until it is half ebb again. But the tides among these islands require further investigation. Capt. Fitz Roy states that the tide flows into both ends of Falkland sound, and that the two streams meet near the Swan island.

Directions.—The two ports most easy of access in Falkland sound to vessels from East Falkland are White Rock bay at the north entrance and Fox bay at the south entrance. There is a little good grassy land near White Rock bay, though quite cut off from the central valley; but Fox bay, though not a good port for large vessels, has a safe anchorage for small ones in the head of the cove in the NW. corner, and a break in the hills there would admit of an easy road to the center of the island. Vessels bound there from port William would have sheltered anchorages all along the south side of East Falkland and through Eagle passage.

From the northward.—Entering Falkland sound from the northward, steer for Fanning head, the high double peak on the eastern side of the entrance; or, if it be obscured, make a S. 2° W (S. 11° E. mag.) course from the Eddystone rock, until within a couple of miles of Race point, when the eastern shore must be kept aboard to avoid Tide rock and the rocks westward of it. Tide rock is about 5 feet above water, and steep to, and forms a good guide to avoid the others by keeping it westward of a S. 24° W. (S. 11° W. mag.) bearing. The soundings from the Eddystone to the entrance of the sound are fairly regular, over a bottom of fine black-speckled sand. Off Race point there is a ledge, which does not, however, extend beyond 200 yards from the point; and from thence to Fanning head the shore is clear.

If the wind and tide are both adverse, it is advisable in a sailing vessel to keep close under the lee of West Falkland until the tide turns.

From abreast Fanning head a course S. 27° W. (S. 14° W. mag.) for 8 miles will bring the vessel to the Northwest islets, which lie off Grantham sound, where the high land of East Falkland terminates. From thence a S. 36° W. (S. 23° W. mag.) course for 14 miles will take her abreast of High Cliff island, which, although small, is the highest in the sound, being nearly 100 feet above the sea. It is remarkable for its white cliff, somewhat discolored by birds, and is first seen from the deck when abreast Grantham sound. Afterwards the low and flat Swan islands, lying in the middle of the sound, will be seen.

Main passage is between High Cliff and Swan islands. After rounding the SE. point of Swan island borrow on the West Falkland to clear Tyssen kelp patch, which has 4 to 5 fathoms close to its edge. A good leading mark to clear this patch, from the SE. point of Swan island, is a horizontal line of white sand, deposited in the ridge of the West

Falkland, bearing S. 64° W. (S. 51° W. mag.). This leads 1½ miles northwestward of the patch, and close to patch of kelp, about 30 yards in extent, at 1½ miles from the western shore, with the south extreme of Swan island bearing N. 60° E. (N. 47° E. mag.) 8½ miles and West island S. 31° W. (S. 18° W. mag.). The course from between Tysson patch and the West Falkland is about S. 20° W. (S. 7° W. mag.), so as to pass eastward of West island.

Swan passage.—In many cases, however, it may be more advantageous to pass west of Swan island, and the Swan passage is straight and clear, the water is smoother, and near it there is better anchorage than in the Main passage where, with a strong gale against the tide, there is a heavy race. In both passages, with a foul wind, the tide is too strong for a sailing vessel to get through; and in this case, or if waiting for the night, if bound to the southward, the best anchorage is near the north end of West Swan island; and if bound to the northward, in the corner between West Swan island and Hill gap, avoiding the shoals. There is a passage for small vessels only between West Falkland and West Swan island.

Oberon patch is about 30 yards long, 10 yards across, and marked by kelp, with 10 fathoms around it, and lies about 1½ miles southwestward of Swan passage; from the patch Hill gap bears N. 77° W. (west mag.) and the east end of Swan island N. 75° E. (N. 62° E. mag.). The west point of Swan island in line with Poke point N. 38° E. (N. 25° E. mag.) leads just clear to the southeastward of Oberon patch.

Tyssen Islands passage.—The passage between the Tyssen islands and East Falkland to the several harbors of the latter is clear and good, the narrowest part being to the eastward of Sandbar island; but even there it is rather more than a mile wide, with a good outlet to Main passage round the north point of Great island. The only shoals in it are a reef about 400 yards from the northeastern point of Great island, marked by kelp, and a spit extending about ½ mile from the south end of Sandbar island, which must be guarded against, as the tide stream sweeps down the kelp, frequently concealing it.

Tickle pass is so narrow and the tidal currents have such a strength that vessels are advised not to use it.

From the Southward.—Entering the sound from the southward, after passing Wood shoal keep at a moderate distance from West Falkland shore, and then the converse of the above directions will be a sufficient guide. As the water in the sound is always smooth with northerly winds and those from the NW., a passage through the sound to the northward is sooner effected than by standing round by the east coast.

Vessels intending to proceed to sea, at either entrance to the sound, would do well to anchor for the night and start at daylight. Good departure places at the north entrance will be found at port San Carlos and White Rock bay, and at the south entrance at Anchorage and Ruggles bays.

WEST FALKLAND ISLAND.

Tamar harbor is the first port west of the northern entrance to the sound. It is not advisable for strangers to use this port, as the entrance, or Tamar pass, is very narrow, and a reef extends nearly half way across from the west entrance point. The kelp on this reef is run under by the strong tidal currents, and the eddies are very dangerous. There is also a kelp patch which shows at slackwater in the center of the channel between the outer and inner entrance, but the least water found there was 3 fathoms. The tide stream sweeps so rapidly through that a vessel wishing to bring up in Tamar harbor must haul out of the stream very quickly to prevent being carried into Pebble sound.

Elephant bay.—For a temporary anchorage, with the wind off shore, the west shore of this bay will answer, though it is very much exposed if the wind should shift to the northward. The peaks on Pebble island are the best marks for making out this part of the coast; they are seen very readily when coming from the northward.

Pebble sound, southward of Pebble island, is about 14 miles long and 9 wide; it is full of islands, and has good anchorage in every part of it. The islands are low, and except Golding and Middle islands, are not well supplied with water through the summer. One of the largest streams in the Falklands, the Warrah, runs into the south side of this sound, and at high tide, boats can go up into the fresh water.

Besides Tamar pass and Northwest pass, there are two other passages into Pebble sound among the islands—Anxious pass, between Golding and Passage islands, and another very narrow one to the southward of all the islands, close to Creek point; but the approaches to them are so intricate that they are not likely to be used, except by coasting vessels. The chart is the only guide to them, for the kelp, as in other channels, is always run down by the tides.

Tides.—It is high water, full and change, in Pebble sound at 8h. 45m.; springs rise 8 feet. Running along the north coast of the islands to the westward, part of the flood rushes through Tamar and Whaler passes, and part sweeps round the West Pebble islet into Keppel sound, filling that sound, and port Egmont, 2 hours before it has ceased running to the westward. This latter portion rushes eastward through the Northwest pass at the rate of 5 to 8 miles an hour; it sweeps through a part of Pebble sound, meeting the floodtide that comes in with equal velocity through Tamar pass, and thus causes whirls and eddies in several quarters. The water having attained its height remains quiet only a little while, and then ebbs with similar fury.

From the westward, if bound through Northwest and Tamar passes; the time should be chosen to run through Northwest pass with the flood, and out of Tamar pass with the ebb.

Port Egmont cays.—Two islands surrounded with rocks and kelp to the distance of ½ mile, extend 5 miles NW. from the west point of

Pebble island, and 3 miles farther westward are Port Egmont cays, of a similar nature.

Wreck and Sedge islands, each about 2 miles in length, east and west, are 4½ miles apart; the space between the islands being thickly studded with rocks and kelp, visible at half tide; the reef also extends nearly one mile northward of Wreck island.

Wreck island is low, and from the southward makes as three low islands; it lies N. 25° E. (N. 11° E. mag.), distant 6 miles from Elephant point, the west point of Saunders island; it must not be mistaken for Port Egmont cays, and should be left to the westward in passing.

Rock.—A rock lies one mile from the SW. end of Sedge island, in the direction of Elephant point.

Keppel sound is southward of the west end of Pebble island, between it and Keppel island. From Reef point, the NE. point of Keppel island, a reef marked by kelp extends off about 1½ miles; care is required in rounding it. South of Reef point is Committee bay, in which is Cranmar Mission station.

Anchorage.—The anchorage off the Mission is good, but vessels of 14 feet draft should not go inside a line joining the north and south points of the bay.

Supplies.—Cattle, sheep, rabbits, and vegetables may be procured.

Port Egmont, in which was the old settlement, is situated to the southward of Keppel island, between it and Saunders island. There is good anchorage in every part, and the tide is not strong. The north and usual entrance into it, between Saunders and Keppel islands, is nearly a mile wide, and clear of danger; but it would take a very fast sailing vessel to work through against the tide. The best anchorage is off Old Settlement cove, close to the southward of a kelp patch; or in Sealers cove, a little further to the SW. where there is a settlement, and which is better sheltered from southerly winds.

Reef channel is a narrow and winding channel leading from the south side of port Egmont into Burnt harbor, and through it to the head of Byron sound, but it is not fit for large vessels.

Supplies.—On Saunders island, ducks and geese are plentiful. Good water is readily obtainable.

Tides.—It is high water, full and change, in port Egmont, at 7h. 30m., springs rise 11 feet, making it the best place in the islands for beaching a vessel; Old Settlement cove is well adapted for this purpose.

Directions.—Vessels bound to Keppel sound and port Egmont from the northward, should endeavor to make the high land of mount Harston, on the western peninsula of Saunders island, which will be seen in clear weather long before the low land of Sedge, and Wreck islands, which lie about 6 miles to the northward of it. Passing between Wreck island and Egmont cays, the entrance to port Egmont will be plainly seen. There is a clear passage on either side of Egmont cays;

and between them and the entrance of the port, there is no danger, except a small kelp patch off the entrance, which always shows, about 1¼ miles to the NW. of Gull point. The passage into Keppel sound is between the reef off North point and that extending from Keppel islet; and there is a passage from it into port Egmont, round the south side of Keppel island, which is quite clear of danger, and well marked by kelp; but it would only be used by vessels that had passed through Pebble sound.

Race rocks lie NW. distant 1¼ miles from Elephant point, the NW. extreme of Saunders island; at one mile to the northward of them is a patch of 4 fathoms, generally marked by a tide rip.

Brett harbor, on the west side of Saunders island, is of little service; it has a long, narrow entrance, and is shoal, with reefs and kelp patches.

Carcass island, the largest of a chain of islands extending in a NW. direction, 16 miles from the SW. point of Saunders island, is easily distinguished by the double peak in its center, 860 feet in height. Off the NW. end lie two islands named the Twins; off the SE. end are the Needle rocks, Low and Dunbar islets; and off the SW. side is Carcass reef, a narrow ridge about 1½ miles in length.

Byron sound, southward of Saunders island, is much exposed to westerly gales, which send a heavy sea up to its head; but there is good anchorage for small vessels in the SE. corner, in the entrance to Hill cove, or the cove itself: but caution is necessary in entering the latter, as a shoal is reported to exist, just inside the two kelp patches, in the center of the entrance.

Burnt harbor is the only good anchorage in the head of Byron sound, and on the north side there is a good watering place; but a long reef in the western entrance forms two narrow channels, through which a small vessel only can work. There is a very narrow channel round the east end of Burnt island, but it is only fit for coasting vessels.

Hope harbor is situated at the NW. point of West Falkland. There is a bank to the northward of the entrance, but not less than 5 fathoms could be found on it. Vessels should anchor off Grave cove, on the south side, where there is a good watering place. At the head of the harbor is a stream, in which at spring tides, quantities of fish may be taken.

Settlement.—There is a cove on the NE. side of Westpoint island, with a large kelp patch off the entrance, but with not less than 8 fathoms on any part of it. Should a vessel intend remaining for a few days, this cove, in which there is a settlement, is the best place to adopt, as it is not exposed to the heavy squalls off the island which rush up Hope harbor. Rabbits are abundant on the island.

Gibraltar reef is an extensive ledge covered with kelp, extending WNW. 7½ miles from Westpoint island, with a white rock about 2 miles within the extremity. The tides run directly across this reef, and it is to avoid the risk of being set towards it, that vessels bound to Hope harbor are enjoined to pass to the eastward of Carcass island.

Tides on North coast.—It is high water, full and change, in Hope harbor, at 8h. 10m., spring rise 10 feet; though it is not slack water in the passage till 10 o'clock. The flood tide sets strongly round the west end of Carcass island towards Gibraltar reef, and also through all the passages into Byron sound; but there is very little tide in that sound, nor is a vessel sensibly affected by it until as far west as Carcass reef. There the flood stream will be found setting very strongly towards Hope harbor, and through it to the southward. The ebb, or eastern stream, sets from Hope harbor towards both ends of Carcass island, and through the channel east of the island, to the northward; but it, likewise, is scarcely felt in Byron sound.

The flood tide sets to the westward along the north side of West Falkland for about two hours after it is high water in port Egmont; the springs run nearly 3 miles an hour off the points and round the islets, causing strong tide rips in heavy weather. After passing the NW. point of Saunders island it runs to the SW. between Carcass island and the islets near it, and through all the channels between Westpoint island and the several Jason islands. Here, again, the tide and half tide nearly occurs as in Falkland sound, for, meeting the tide wave from the southward round the western islands, the last four hours' flood and the first two hours' ebb run to the northeastward.

Directions.—Vessels bound to Hope harbor, from the northward, or to any of the ports to the southward of it, should avoid getting to the westward of Carcass island, as between it and Jason islands are several reefs, the kelp on which is run under by the tide. But from Sedge, or Wreck island, to the east end of Carcass island, the only dangers are the foul patch, with 4 fathoms water, about ½ mile outside of Race rocks, and the patch 3 miles northwestward of them. With a strong breeze there is a heavy race for nearly a mile west of the 4-fathom patch; but by giving them a berth of a full mile, which all vessels should do, there will be no danger, and a direct course may then be steered for the Needle rocks, or for the eastern end of Carcass island.

The passage eastward of the Needles is the best, as these rocks may be almost touched. From thence to the entrance of Hope harbor there is no danger but what shows well above water; and though vessels may have to make 2 or 3 tacks to reach the harbor, it is much better to do this than to pass between the reefs to the NW. of Carcass island, with the chance, if the wind fail, of having to anchor in order to avoid being swept through between the Jason islands and Wespoint island. Nor is there any well-sheltered anchorage there, if it should be necessary to wait for the tide; whereas, by steering for the eastern end of Carcass island, good anchorage will be found in 7 to 12 fathoms in the bay at the eastern end of that island, except with northerly winds, and then vessels may anchor off the bay, on the south side, to the northeastward of Carcass reef.

Caution.—When entering Hope harbor, Hope point should not be passed nearer than 200 yards, as the kelp is under-run by the tide. No sailing vessel can enter against the tide, except with a good leading wind. If the wind be between NW. and SW. it would be useless for her to attempt going out through Westpoint pass, the southern channel, against the tide, as the wind would be so baffling; but she may bring up in the entrance of the cove in Westpoint island, and wait there for slack water.

In passing to the northward through Westpoint pass, it is necessary to wait for the tide, unless the wind should be to the southward of SW., and even then it may be difficult to get through the northern part of the channel; should this be the case a vessel ought to bring up in the entrance to Hope harbor, out of the stream of tide, and wait until slack water.

A vessel bound from Hope harbor to the northward should again pass to the eastward of Carcass island and the Needles, and to the eastward of Wreck island; thus avoiding all the reefs and tide rips to the westward and northwestward of the Twins and Carcass island. Should it be necessary to pass to the westward of Carcass island, the best passage is just westward of the Twins and southward of the rock, which always breaks, lying 2½ miles northwestward of Carcass islands. Westward of this rock there are some reefs, the kelp on which only shows at slack water, and vessels should cautiously avoid them, as we have no clearing marks to offer.

Jason islands form a chain extending northwestward 38 miles from Hope point, the NW. point of the Falklands. Jason West cay, at the extremity of the chain, is low and less than a mile long; Jason East cay is of a similar nature. Grand and Steeple Jasons are lofty, the former being 1,210 feet in height; inshore of these lie Flat, Elephant, and South Jasons. The latter has a ledge termed Hope reef, extending 4½ miles northeastward from it; the space between this reef and Carcass island is full of ledges and tide rips. The passages between these islands are little known and should be avoided; those between Flat Jason and Westpoint islands are full of dangers, the tide setting violently across them, particularly Gibraltar reef.

Westward of Flat Jason the passages are clearer. Should the tide, in light winds, set a vessel towards them, by keeping near the middle of the passage she will be taken clear through; but having passed in this manner, between Grand and Flat Jasons to the southward, care must be taken that, on the turn of tide, the vessel is not swept towards the South Jason and the reefs off Westpoint island.

Kelp.—Mr. C. Hansen, master of the schooner *Foam* (1890), reports having passed through a patch of kelp about ½ mile in extent; the wind at the time was northeasterly, with a rough sea, but no breakers were seen. From the patch, the west end of Steeple Jason bore approximately S. 14° E. (S. 28° E. mag.), and its distance 7 to 8 miles. It was estimated to be slack water when the *Foam* passed through, and that the kelp would be under water when the tidal stream (which in this locality attains considerable velocity) is running.

King George bay.—The passage into this bay is quite clear on either side of Split island, and the different openings through the Passage islands are also plainly seen.

Port North is a deep bight on the northern shore of King George bay, with from 10 to 16 fathoms of water, exposed to westerly and southwesterly gales. There is a valley with a good stream at the head of the port. At Pickthorn point, which separates port North from King George bay, there is good anchorage for small vessels, in Bense harbor between the two Bense islands and the mainland, with a clear passage through it.

Hummock island is the best guide in running up King George bay; its peak forms a cliff on the north side, and slopes off to the southward. Halfway between Bense harbor and Hummock island stands Rabbit island, the west side of which is a high and conspicuous cliff. About 1½ miles to the southwestward is a kelp patch. Between Rabbit and Hummock islands there is a chain of small islets, through which there are three good passages; one close to the south point of Rabbit island, and the other two on each side of the islet nearest to Hummock island. They are all clear of danger; but the tide sets rapidly through them, and a vessel should endeavor to keep nearly in mid-channel.

Whaler bay, in the corner northward of Rabbit island, offers a safe and good anchorage, with coves for small craft, and good watering places. There is a narrow channel, between Rabbit island and the main, into this anchorage, but it is scarcely fit for the smallest vessels, being very narrow, and the tide strong.

Roy cove.—On the north shore of King George bay, abreast Hummock island, is a very secure and deep creek, named Roy cove, and in which there is a settlement. The rise and fall of tide is 10 feet at springs, so that it is a good place for beaching small craft; and, being deep close to the rocks, it answers also for heaving down a vessel.

Christmas harbor is an inlet at the head of King George bay; and Chartres river, which falls into it, and on which are two settlements, leads to the center of West Falkland. There are several creeks, and large fresh-water streams running through some of the best-watered land in the whole group. The entrance to the harbor, near Town point, is about one mile wide, which, after a vessel has passed Hummock island, appears as if covered by scattered houses; this appearance being caused by numerous patches of white sand spread over the side of the hill above the point. Middle island and that eastward of it may be passed on either side; and there is good anchorage inside them, off the mouth of the harbor.

A long narrow reef, covered with kelp, lies in the entrance of the harbor and forms two channels. The southern is only fit for small craft, there being only 2¼ fathoms at low water on a bank which extends from the west end of the reef to Town point; but northward of the reef the channel is clear, with 4 fathoms, as far as Tide islet, which is small and green, and abreast which is the best anchorage for large vessels. Nearly one mile above Tide islet, where the harbor widens, a bar extends across the harbor, the deepest water over which is 2½ fathoms, near the south shore; but in mid-channel, and from thence to the north shore, there is only a depth of 3 feet; and this shallow water, having a sandy bottom, is not marked by kelp.

The best guide is the kelp on the south shore, which should be left about 400 yards distant, until the water deepens to 4 and 6 fathoms, whence there is good anchorage for a space of 2 miles with that depth.

Water.—There are several good streams of water in different parts of this harbor, but the easiest of vessels is that marked in the chart, on the south shore, nearly abreast Tide islet.

Passage islands.—King George and Queen Charlotte bays are separated by a long narrow strip of land, the extremity being named Dunnose head, off which are the four Passage islands. East and Whale, the two eastern passages through these islands, are very good and clear of all danger; the streams of tide set directly through them, turning at about half flood and ebb by the shore. The third or West passage is narrow, but good with a leading wind. The Fourth or False passage is completely blocked by kelp.

Northwestward of Fourth island ¾ mile there is a kelp patch, with 14 fathoms between it and the island. There is a tide rip here with strong breezes.

Passage islands are steep-to, and there is no outlying danger but what shows plainly. Round island, and the Sail rock near it, are good marks for Whale passage, the easiest channel for vessels to pass through, but with a foul wind it would be always necessary to wait for the tide.

Anchorage.—There is no good anchorage near the islands; but vessels detained by a southerly wind, or caught in a southerly gale, might anchor under the lee of Dunnose head near the entrance of Rous creek, a small cove in which there is water for vessels drawing 14 feet; and vessels, if damaged, might safely make for this cove, and run on the sand at its head; the cove is well sheltered, and the water always smooth. On the south side of Dunnose there is no safe anchorage short of Philomel road, about 10 miles southeastward of that headland.

Queen Charlotte bay.—This extensive bay, 10 miles wide at the entrance, between Dunnose head and Swan point, is mostly clear of shoals and possesses several good harbors.

Philomel road.—Shallow harbor, in the NW. corner of Philomel road, is the first anchorage on the north side of Queen Charlotte bay, and may be easily known in coming from the westward by the steep bluff about 2 miles to the westward of it. When abreast this bluff, Green island, which lies off Philomel road, will be plainly seen. This small island may be passed close to, on its south side; and a vessel can then haul up directly into the road, on the north side of which lies Shallow harbor. The chart, and a lookout for kelp, of which there are several patches, will be better guides than any directions. The small islet in the entrance of the harbor may be passed on either side; but if to the westward, take care not to pass too close to Shallow point, on the mainland, off which shoal water extends 200 yards outside the kelp. All other dangers are marked by kelp and can easily be avoided.

There is a narrow channel into Philomel road to the northward of Green island, across the kelp reef which extends a long way northward of the island, nearly joining the kelp off Dick point; but there is a narrow clear channel near the point, through which there is a depth of 6 fathoms, and, with a leading wind, is perfectly safe; but it requires a good lookout from aloft.

Port Philomel.—At the NE. end of Philomel road a narrow channel, nearly 6 miles long, leads to the large landlocked harbor of port Philomel, but the tide is so strong in this channel that it is hardly safe for any but small quick-working vessels to venture up it, particularly through the Narrows between the two small islands at its inner end; there is, however, a small bay on its north side below these islands, named Halfway cove, in which there is excellent anchorage, out of the tide. Vessels going through should anchor here, even if going up with the tide, and wait till slack water to shoot through the Narrows.

So great is the area of this splendid harbor that the entrance is not sufficiently large to admit the water as fast as it rises outside; and consequently it is high water inside 2¾ hours later than in Philomel road and in Shallow harbor, and rises 2 feet less.

When inside the Narrows there is no danger in any part of port Philomel except what is marked by kelp; there is excellent anchorage in every part of it, in 7 to 10 fathoms; and in all the creeks there is good anchorage for small craft, in 2 to 4 fathoms. The surrounding shores of the port are well watered, except on the peninsula between the port and Queen Charlotte bay.

In the SE. corner of Symonds harbor, south arm of port Philomel, there is a deep creek, where abundance of fish may be caught by shooting a seine across at high water, about the distance of ½ mile from its head, and then waiting for the tide to fall. In Edye creek there is a watering place.

Port Richards, in the SE. corner of Queen Charlotte bay, is a deep inlet, the head of which nearly joins the inner basin of port Edgar; but it offers no very good anchorage, except in a cove on the north shore. It is completely out of the track of vessels.

Antony creek and Carew harbor are two small well-sheltered anchorages on the south shore at the entrance to port Richards, with 12 to 17 fathoms water, except in the southern coves, where there is excellent anchorage in 4 to 7 fathoms, and good watering places.

Vessels requiring anchorage in the SE. part of Queen Charlotte bay should run into one of these ports in preference to port Richards. Antony creek, the western, is the better, as the water is not so deep as it is in the other, and 10 or 12 fathoms may be found off a cove on the west shore, a little inside the entrance. The land is high on all sides of both creeks.

Double creek, a little to the eastward of Carew harbor, affords very good anchorage for small vessels inside the islets at its entrance.

Gull harbor, on the eastern side of Weddell island, is an excellent port, and in which there is a settlement.

Tides.—It is high water, full and change, in Shallow harbor at 9h. 30m.; springs rise 8 feet. At Halfway cove, in the narrows leading to port Philomel, it flows till 11h. 45m., and with a velocity of from 8 to 10 miles an hour.

New islands.—Vessels from the westward bound into either King George or Queen Charlotte bays should make this island. It is the northern one of the high steep islands which form the SW. portion of the Falkland group; the lofty cliffs of its NW. shores are very remarkable. If coming from the SW. these cliffs will be seen as the extreme point of land, while from the NW. two small but high islands, North and Saddle, will be seen to the northward of New island. Between New and these islands there is a clear passage, but as it is narrow and the wind often baffling under the high cliffs it is recommeded that vessels pass outside of North island, which is steep-to.

Ship harbor is an excellent place if a vessel is going to remain any length of time. A vessel bound for this harbor should haul round the NE. point, and, passing close outside Cliff island, haul up for Small islet at the head of the harbor. The best anchorage is inside this islet; there is working room on either side of it and deep water close to the kelp patches. The best watering place is on the beach at the head of the harbor; the water is very good and it is impossible to find a place better suited for vessels to touch at for obtaining a supply, if passing to the westward of the islands. There is an abundance of excellent peat on the island, and rabbits are very plentiful.

South harbor.—There is a settlement here; but the holding ground is said to be hard and indifferent.

Grey channel is clear of all danger on either side of the Seal rocks; the tidal currents are very strong, and with westerly winds there is a heavy race, so that it would be always better for vessels to pass round to the northward. But standing to the southward from Ship harbor with a northerly wind, by waiting for the tide to turn, vessels may always run out through this channel.

Tides.—It is high water, full and change, in Ship harbor at 10h.

30m.; springs rise 8 feet; the stream makes to the westward in Grey channel at 7h. 30m.

The tidal currents between West point and New island are not very strong and, except near the points, would not prevent a vessel working either way.

Directions.—Though the bays in West Falkland appear so much exposed to westerly winds, there is much less swell in them than might be expected. The tide in the offing, running across the bays from point to point, renders their navigation much easier, while they contain so many well-sheltered harbors and anchorages that a stranger, if caught in a westerly gale and unable to weather the headlands, need have no hesitation in running up either King George bay or Queen Charlotte bay. In the former he will find good anchorage inside of Hummock island, and in the latter by hauling round Swan point and anchoring under the lee of any part of the east side of Weddell island; or, if the weather be quite clear, running for Shallow harbor on the north side of Queen Charlotte bay.

New island might be found most useful to vessels caught in heavy gales to the SW. of the islands, instead of knocking about for days and nights, with the chance of getting on a lee shore or being drifted towards the Jason islands. Directly the high cliffs of New island or Beaver island are seen a vessel should bear up and pass northward of New and North islands, and haul to the southward into Ship or South harbor. The former is preferable, as the holding ground in South harbor is reported to be hard and indifferent. There she might lie quietly, saving all the wear and tear of the vessel and crew and filling up with water and fuel, and probably obtaining fresh provisions from the settlement; and as soon as the gale is over and the wind draws round she can run out either to the northward or southward, and proceed on her voyage.

It might happen that a vessel endeavoring to enter Ship harbor, either from the strength of the gale or from previous damage, might be unable to fetch into safety; in which case she should not hesitate to bear up, and running along the group of islands off the NW. coast of Weddell island, she will soon make out Bald island, and passing it on either side may haul up into excellent anchorage in Bald road or Chatham harbor.

Weddell and Beaver islands.—To the southward of New island there are numerous anchorages in the channels between Weddell and Beaver islands.

Beaver harbor is the best of these anchorages on the east side of Beaver islands; the kelp will be a good guide into it. The northern entrance to these channels is well marked by two singular rocks, named the Colliers, which look like vessels under sail. They are on the western side of the entrance and may be passed close-to on either side. These channels are too intricate to be used except in cases of necessity.

The tidal stream sets very strongly through them, and at the southern entrance often forms a heavy race. Vessels caught off the southern shore of the group in a SW. gale, and unable to weather Beaver island, might run for either Governor or Tea channels in safety.

Governor channel is clear of all danger and may be entered during the heaviest gales in safety, and by hauling close round the north end of Staats island good anchorage, sheltered from all winds, will be found off its NE. end; as the water is rather deep, 15 to 18 fathoms, for vessels to get their anchors quickly it would be better for them to run through this channel, past Middle island, and then French harbor will be seen a little on the starboard bow. Staats island is easily known by the remarkable detached cliff at its south point. Immediately to the westward of this bluff is the entrance to Governor channel.

French harbor is a bight into which any vessel may run in safety, furling her sails before she gets in, and should it be blowing strong from the westward, and anchor in its south corner, in 5 to 7 fathoms. The only disadvantage is that the channel is rather narrow to work out again, but is quite clear from shore to shore, and a vessel may tack in the edge of the kelp on either side.

Tea channel is also very good, being clear right across; there is kelp all over the entrance, though it shows only at slack water. The least water in the kelp is 6 fathoms; but there is a strong race across the entrance when the wind is blowing fresh from the southward. This passage is well marked by the Horse block, a remarkable islet about 3 miles to the southward and eastward of the entrance.

The narrow channel between Staats and Tea island is hardly fit even for boats, at low water; and that to the westward of Governor island is also very narrow and only suitable for very small craft. There is kelp across the entrance, with only 2 fathoms water through it.

Bald road is on the west side of the entrance of Chatham harbor. Coming from the westward Bald island, small and round topped, with a high cliff on its west side, will be seen lying close off Beacon point, on which there is a hill about 275 feet high (with a small stone beacon, which can be seen several miles). There is a safe channel between this point and Bald island, with good anchorage in Bald road, just south of the point.

Chatham harbor.—If a vessel pass eastward of Bald island, she must give it a good berth to clear a detached kelp patch which lies ¾ mile to the eastward of it, and she may then either anchor in Bald road or run up to Chatham harbor. All the dangers there are marked by kelp; and the best anchorage is in Elephant cove, where there is a good watering place.

Tides.—It is high water, full and change, in Chatham harbor at 9 h.; springs rises 8 feet.

Smylie channel, South harbor.—There is a safe entrance through this channel into Queen Charlotte bay between Weddell island and the main. Cape Orford, the south entrance to this channel, is cliffy, with Orford hill within it, about 325 feet high; a small island named the Sea Dog lies off it. There is a heavy race in Smylie channel with westerly winds, when the tide is running out; and the kelp, which extends nearly across the west entrance, shows only at slack water; but under the kelp there is a depth of 4 fathoms. The deepest water is on the Weddell island side of mid-channel. When inside this entrance, two openings will be seen on either side of Dyke island; the northern one leads directly into Queen Charlotte bay, and the other into South harbor, in every part of which there is good anchorage for large vessels.

The reefs at the east entrance of Smylie channel always show, and can be passed on either side in safety; but the best passage is that close to the shore of Weddell island.

Stop cove.—Good anchorage may also be found on the western side of Smylie channel, in Stop cove, which is formed by a low green tussac island, joined to the shore by a spit, dry at half tide. Vessels bound to the westward through Smylie channel may anchor in this cove, to wait either for the tide or daylight; and it is the best anchorage in any part of the channel.

Penguin cove.—There is a good watering place in Penguin cove, about a mile north of Stop cove; and geese are abundant.

New Year cove, on the eastern side of Weddell island, just within the northern entrance of Smylie channel, is an excellent port.

House cove.—There are some coves on the eastern side of Dyke island with good watering places, but they are out of the way of vessels going through Smylie channel. One of these, House cove, is an excellent place to lay a small vessel ashore, the rise and fall of tide being about 10 feet.

Rodney cove is the only place of shelter on the south side of the West Falkland, between cape Orford and port Stephens. It is a secure and safe anchorage, but can only be entered with a leading wind. The kelp extends nearly across the entrance; but there is water in mid channel for large vessels. A small lane of clear water, near the middle of the kelp, shows the channel; and when inside the kelp, anchorage may be found in any part of the cove in 3 to 8 fathoms.

Port Stephens is the first port to the westward of cape Meredith. The land is very remarkable; Bird island, Castle rock, and Stephens bluff, a remarkable cliffy head, lie to the westward of the port; and there is a notable hill named the Three Crowns, 480 feet high, with three distinct masses of bare rock, to the southeastward.

The entrance, 400 yards wide, is easily seen, and lies between two cliffy points, 60 or 70 feet high, named Pea point and Cross island.

A small rocky islet lies northeastward of Stephens bluff, off which there is kelp, and a rocky bottom, for nearly ½ mile in the same direction.

Settlement.—Within the entrance, the port is about 7 miles in length and from one to 2 miles in width. Anchor inlet is at the entrance and Hoste inlet in the northern part of the port. At the western extremity, at the head of a small inlet, is the settlement, consisting of red tiled buildings, and a flag staff.

Communication is kept up with Stanley harbor by means of a steamer or schooner, which conveys the mails and supplies.

Anchorage.—There is good anchorage off the settlement in 13 fathoms, with Stephens peak about S. 25° W. (S. 11° W. mag.), small vessels may go nearer the settlement.

Also, in Anchor inlet, there is snug anchorage in 9 to 13 fathoms, mud; off the sandy beach on the eastern side.

Kelp extends off both points of the inlet, but the water is deep to the edge of it. There is also a fair anchorage to the SE. of the rocky islets.

Tides.—It is high water, full and change, in port Stephens at 7h. 45m.; springs rise 7 to 8 feet.

Directions.—In making port Stephens from the northwestward, Castle rock, and the outer part of Stephens bluff have a very similar appearance. When running for the port, vessels may pass tolerably close to them, as they are steep-to; but if there be much swell from the southward, it would be better to open the entrance well out before standing in.

From abreast Stephens bluff, the entrance must be approached bearing N. 14° E. (north mag.), to avoid the foul ground NE. of the bluff, and which will lead clear of all danger. Some stalks of kelp may be seen, but they can be avoided by keeping a little more to the eastward. The tide seldom runs more than 2 miles an hour.

Within the entrance, the two rocky islets must be left on the starboard hand, when course may be shaped for Anchor inlet, or the settlement. The dangers northward of Knoll island are all marked by kelp.

Vessels not wishing to enter the port may find a convenient stopping-place between Pea point, the west point of entrance, and Stephens bluff. Steer as if intending to enter the port, and when about ¼ mile from Pea point haul to the westward, keeping near the north shore until abreast Stephens Bluff island, and anchor where most convenient; the bottom is sandy, mixed with mud, and the depth from 6 to 10 fathoms. This is a convenient place for vessels anchoring for a night, as it is easier left than port Stephens. In entering it will be necessary to pass through some straggling stems of kelp, but the water is deep.

A good anchorage may also be found by passing between Cross island and the islets SE. of it; but it is difficult to leave, as westerly winds blow directly into the entrance, and it is too narrow for a vessel to beat through.

Port Stephens is not easily quitted, excepting with a fair wind; particularly after a breeze from the southward, as then a heavy swell sets in.

Arch road, the next port to the eastward of port Stephens, is a good anchorage, and much frequented by whaling vessels. It is formed entirely by the Arch islands, which are remarkably rugged, with upright light-colored cliffs, and take their name from a natural archway at the SW. end of the south island. The road is entered by passing to the westward of the two large islands, between them and Clump island. This anchorage, on account of the more convenient depth for anchoring, is preferred to that of port Albemarle. Vessels lie here well sheltered from the swell, but they feel the full force of the wind.

A shoal of 2½ fathoms, about one mile in extent NE. and SW., which breaks in heavy weather, and is seen by the kelp when not underrun by the tide, lies southward, distant nearly one mile from the South Clump island.

Port Albemarle.—Albemarle rock is a good guide to port Albemarle. It is bold, upright, about 150 feet high, saddle-shaped at the top, and whitened at its side by innumerable birds which frequent it. It is eastward, distant 1¼ miles from the NE. end of the Arch islands, and may be passed on either side at the distance of ¼ mile.

To enter this port vessels may pass on either side of the Arch islands, care being taken to avoid the patch of 2½ fathoms, southeastward of Clump island. The water in Albemarle road is inconveniently deep, but free from danger, and leads to a good anchorage in Lucas bay in 10 fathoms, to which large vessels may work up with ease after rounding Lucas point.

Albemarle harbor is 5 miles NW. of the road, at the head of NW. arm, with depths of from 10 to 12 fathoms. The arm being only from 400 to 600 yards in breadth would be difficult to work through. There is a settlement in the north islet of the harbor.

Chaffers gullet lies close to the northward of port Albemarle, and its deep water branches extend several miles inland; but it is too narrow to call for a more detailed description at present.

From Arch islands to port Edgar the coast is bold and clear, and the rate of the tide does not exceed 2 miles an hour.

Wood shoal is situated about 9 miles SE. from the entrance to port Edgar. The shoal is nearly circular, with a diameter of about 2 miles. The soundings on its northern edge are regular, from 13 to 16 fathoms, with straggling kelp beyond. The reef is well marked by thick kelp, and the least water found was 11 fathoms; but having been seen to break during southerly gales it may be much shoaler in some places; and, as thick patches of kelp always indicate danger, it had better be carefully avoided.

At times the kelp is not seen in passing, when probably it is underrun by the tide.

Port Edgar is easily known after making cape Meredith or the Arch islands, and it is the nearest opening westward of Fox bay, about 5 miles distant. The entrance, a little more than 200 yards across, is between two bluff heads, and with the wind northerly it would be difficult for a square-rigged vessel to enter without warping.

As a secure harbor port Edgar is second to none. It is about 7 miles in length by one mile in width, with anchorage in any depth under 17 fathoms. The inlet westward of the entrance will accommodate the largest vessels.

There is a settlement at the head of the creek on the south side of the entrance to the inlet.

Port Edgar has a great advantage over all the harbors to the northward and westward of it, having a moderate depth of water for some distance outside. When blowing hard from the northward or westward, so as to prevent a vessel from entering, an anchor may be dropped in from 15 to 20 fathoms sandy bottom anywhere under the ridge that forms the western point of entrance, and which extends nearly north and south about 4½ miles. With these winds the water outside is quite smooth, and if they should veer to the southward, so as to make it necessary to weigh, the port will be open to leeward.

Tides.—It is high water, full and change, at port Edgar, at 7h. 15m., springs rise 6 feet. There is but little tide at the entrance.

Directions.—When the wind is between west and SW. it is very baffling and squally, therefore good way should be kept on the vessel when entering port Edgar, and the western shore well closed even to the edge of the kelp, where there is a depth of 24 feet a few fathoms distant from the rocks. By this means a vessel may shoot in past the heads, so as to get the steady breeze inside. When once within the heads the harbor opens out suddenly. The rocks on both sides the entrance are bold-to. There are from 10 to 12 fathoms in mid-channel.

This port should not be quitted after a southerly gale without a commanding breeze, as the swell is heavy without the heads, and continues for some time. But, as northerly winds generally follow a breeze from the southward, there is little fear of a vessel being detained.

Burdwood bank, situated about 90 miles south of Falkland islands, is about 210 miles long east and west, and 60 miles across the broadest part (western), with general depths of 60 to 80 fathoms, bottom chiefly coral, and 25 to 30 fathoms near the middle. There are depths of 133 to 195 fathoms close to its southern edge and 103 to 117 fathoms close to its northern edge.

CHAPTER XV.

SHAG ROCKS, SOUTH GEORGIA, SANDWICH, SOUTH ORKNEY, AND SOUTH SHETLAND ISLANDS, AND GRAHAM LAND.

Shag rocks.—These rocks, assumed to be in latitude 53° 48′ S., longitude 43° 25′ W., were reported to have been seen on April 2, 1855, by the master of the ship *Ellerslie*, who described them as showing as three separate peaks about the height of a ship's mast above the water. More recently Capt. C. Vaux, of the ship *Epsom*, bound from Callao to Ceylon, sighted three rocks which he made to be in latitude 53° 40′ S., longitude 43° 30′ W. They appeared to bear about north and south from each other about ½ mile apart, pinnacle in shape, black, and about 150 feet high. These rocks, which at one time were reported to be awash, may have given rise to the supposed existence of the Aurora islands.

South Georgia, lying between the parallels of 54° and 55° S. and between the meridians 35° 50′ and 38° 15′ W., was discovered by Antony La Roche in 1675, and was explored and taken possession of by Capt. Cook in January, 1775. In March, 1823, it was visited by Mr. James Weddell, Master, R. N., and in August, 1882, the German expedition for observing the transit of Venus landed here.

South Georgia is about 100 miles in length in a NW. by W. and SE. by E. direction and 20 miles greatest breadth. The island is high and appears to consist of almost perpendicular mountains, and usually covered with ice and snow to the water's edge. After a mild winter the lower hills near the coast appear of a light-brown color, free of snow. The shores, especially the northern, are deeply indented, reducing the island in one place to ½ mile only in breadth; but the large quantity of ice in the bays must render them inaccessible during the greater part of the year and dangerous for a vessel to lie in, on account of the breaking of large parts of the ice cliffs, which, during Capt. Cook's visit, broke off and floated to sea. Also the *Moltke*, in passing Possession bay, observed two massive glaciers fall into the sea; many icebergs were close to the coast and some aground in the bays. The *Jane* and *Beaufoy*, in the month of March, anchored in Adventure bay on the SW. side of the island, in 7 fathoms clay, and "the crew, after having suffered much from cold, fogs, and wet during the two months they had been navigating the southern ocean, fed plenteously on young albatrosses and greens, which, although bitter, are very salutary, being an excellent anti scorbutic.

The climate of South Georgia must always cause it to be almost an unknown land, for an everlasting winter reigns over it; even in summer the valleys are covered with frozen snow of a great depth, the only parts in which vegetation appears being on the NE. side during the summer, when some of the snow becomes melted; the SW. side being deprived of the sun's rays by the great height of the mountain, is always frozen.

The inner parts of the island are desolate and almost entirely barren; the only vegetation seen was a coarse, strong-bladed grass growing in tufts about 2 feet high, wild burnet, and a plant like moss which sprang from the rocks.

Islets.—There are numerous offlying islands, the most important of which are the Clerke rocks, lying eastward about 40 miles from the south end of the island. Cooper isle, at the SE. end, is a rock of considerable height and one mile from the main. About 8 miles NNE. of Cooper isle, and about the same distance off shore, is a reef of rocks. Off cape Disappointment, 15 miles SW. from Cooper isle, there are three or four small isles, the southernmost, named Green island, is low and flat, and lies 3 miles from the cape. Wallis isle, near the western extremity of South Georgia, is a high rock of moderate extent. No rivers or streams were seen.

Cumberland bay.—The anchorage in the SE. corner of Cumberland bay (in 19 fathoms) was found to be unsafe on account of drifting ice, and the vessel during a violent snow squall, having dragged into deep water, proceeded for Royal bay, where, after some delay, caused by continued bad weather, she anchored on the 21st August.

Between Cumberland and Royal bays a large and well-sheltered bay, with some low rocky islets in the entrance, was found to exist, but in the inner part an iceberg was aground and thus blocked the entrance.

Royal bay—Moltke harbor.—This anchorage is in a small bay now named Moltke harbor, on the western side of Royal bay, in latitude 54° 31′ S., longitude 36° 6′ W., and being found to afford fair landing, with comparative freedom from glaciers, was chosen as a site for the observatory. The bay is about 1½ miles across the entrance, one mile deep, is fringed by kelp on either side, and has depths of 22 fathoms, decreasing gradually towards the head of the bay. Rocks and sunken rocks, marked by heavy breakers, extend southeastward about ½ mile from the north side of Royal bay. No shoals were found outside the kelp. The harbor is difficult to distinguish on account of the low land on its north side, but from off the entrance two glaciers will be observed in the bight; on the western side of the smaller one is a black rock about 80 feet high, which stands off well against the snow-covered mountains. Coming along the shore, capes George and Charlotte are conspicuous, the former on a NW. bearing appears as a projecting rock, with a saddle behind it; the latter has three conical hills; from abreast they resemble many other points along the coast.

In Moltke harbor the soil is found to be covered with a layer of peat over clay, and subsoil of black sand and gravel. Tussock grass was found growing under the snow, and with the exception of moss, was the only vegetation seen.

Seals, penguins, and many kinds of sea birds were numerous; and of eatable kinds, duck and pigeons were found.

Directions—Anchorage.—Approaching from the NW. steer for cape Charlotte, and after having passed the breakers at a distance of 1½ miles, steer for the land between the two glaciers. When Moltke harbor opens out to the WNW., steer for its center, and anchor in 12 fathoms, about ⅜ mile from the head of the bay.

The anchorage is sheltered from ENE. through north and west to WSW., but is open to the other quarters, particularly from ENE. to ESE. Stong westerly winds blow here in squalls of hurricane violence, setting in from SW. and shifting to NW. SE. winds send a heavy sea into the bay, and it is recommended that when these winds blow—and they seldom last more than twenty-four hours—vessels should put to sea.

In calm weather, with an easterly swell, drifting ice is brought into the bay by the flood tide.

Tides.—It is high water, full and change, at Moltke harbor at 7h. 20m.; tides rise 2½ feet, but are much influenced by the wind; the streams set fairly in and out of the bay at the rate of ½ mile an hour.

In the offing the current was observed to set from E. by N. to NE., ½ to one mile an hour, and close to the coast it set ESE.

Sandwich group.—These islands, which were discovered by Capt. Cook in 1775, consist of a group of eight, namely: Zavodovskii, the northernmost, Visokoi, Lieskov, the most western, the two Candlemas isles, Saunders, Montague, Bristol, and Southern Thule; also two islands, each volcanic, and consisting of barren black rocks, some of which are of great elevation and are covered with ice and snow. Zavodovskii is in latitude 56° 18′ S., longitude 27° 30′ W., the islands occupying a space of 200 miles in a north and south direction.

In the end of February, 1823, Capt. Morrell, of the *Wasp*, while sailing round this group of islands, observed nine active volcanoes, six of which were lofty, and three, including the western of the two Candlemas islands, were low, and nearly level with the water's edge. Bristol island has a lofty peak named Freezeland, shaped like a sugarloaf. Southern Thule consists of two islands of vast height, and in the NE. side of the western isle, Capt. Morrell discovered a good harbor.

The South Orkney islands were discovered by Capt. Powell, in the sloop *Dove*, in 1821. They were subsequently visited by Mr. Weddell in 1823, and by Admiral D'Urville in 1838. They consist of two principal islands, named Laurie and Pomona, or Coronation islands, and a number of smaller ones. Cape Dundas, the east point of Laurie island, is placed in latitude 60° 54′ S., longitude 44° 20′ W.; thence the island extends about 25 miles to the westward and is about 8 miles in breadth. The summit is 3,083 feet above the sea. Northward of the western end of Laurie island are several smaller ones; the outermost named Saddle island, on account of its appearance, is estimated to be about 1,500 feet in height. The passage between Coronation and Laurie islands is divided into two straits by a group of islands named after the discoverer, the eastern one called Washington strait, and the western, Lewthwaite.

Coronation island extends in a NW. and SE. direction about 38 miles and is about 12 miles broad; the highest peak in this island attains an altitude of 5,397 feet; Penguin point, its NW. point, is in latitude 60° 33′ S., longitude 46° 40′ W. Westward of this island are numerous rocks, and nearly midway between it and the Inaccessibles, one named Despair rock. The Inaccessibles lie 25 miles to the westward of Coronation; the summit of the highest is 337 feet above the sea.

Mr. Weddell remarks that the "South Orkneys are if possible more terrific in appearance than the South Shetland. The tops of the islands for the most part terminate in craggy towering peaks, and look not unlike the mountain tops of a sunken island." The loftiest of these summits towering up to a point he named Noble peak, which in clear weather is visible at a distance of 45 miles.

The South Shetland islands, most of which are volcanic, were discovered by Mr. W. Smith in the brig *Williams* in February, 1819, when on a voyage from Buenos Aires to Valparaiso and standing far to the southward. They were examined by Capt. Bransfield in 1820; and were visited by various navigators up to 1843, when they were examined by Capt J. Ross, from whose collective observations their position and configuration have been obtained.

The most northerly and best known of these islands are Clarence, the easternmost; Elephant, the northernmost; King George, Nelson, Roberts, Greenwich, Livingston, Deception, Snow, Low, and Smith islands. They extend in a NE. and SW. direction about 260 miles, are separated by deep channels and surrounded by innumerable islets and rocks. Sugarloaf island, which is about a mile distant from the east side of Clarence island, is in latitude 61° 15′ S., longitude 53° 50′ W., and as far as can be at present ascertained is the most eastern part of the group; the most northern rock, lying off Elephant island, is placed in latitude 61° 0′ S., longitude 55° 40′ W.; and the most westerly rock in this range, Williams rock, to the southward of Smith island, in latitude 63° 17′ S., longitude 63° 0′ W.

All the northern parts of the coasts of the South Shetlands abound with islets, rocks, and breakers, while the southern coasts are entirely clear of these dangers; in the early part of the spring the southern sides are blocked with ice, which comes from the mainland adjacent to the southward; this mainland is bordered by rocks and breakers.

The interior of the South Shetlands consists of high hills or mountains, Clarence and Smith islands being over 4,000 feet in height.

The islands, all the year round, are almost entirely covered with snow. and only after midsummer (in January) a few tracts which are free from snow are overgrown with lichens and mosses, in some places supplanted by a sort of straggling grass. A species of coal was found, which burnt very well. The summer may be compared to a dull November in England, and the winter as one long, starless, and desolate night. A perpetual gloom prevails which the sun seldom or never penetrates, so as to be distinctly seen for many hours together; fine days are few and far between; the atmosphere is laden with vapor, causing everything to be damp and humid, but the climate may be considered as healthy. Sea fowl, such as the albatross and penguin, are numerous, as were also seals before their extermination by seal hunters.

Bridgman island is near the center of the Shetland group, in latitude 62° 10′ S., longitude 56° 40′ W.; it is of volcanic production, small, nearly circular, 400 feet high, and partaking of the form of a sugarloaf. Capt. Weddell, when passing within 200 yards of it in 1822, observed smoke issuing from the fissures of the rock.

Deception island is the SW. island of the main group, and lies 100 miles west of the northern point of Louis Philippe land. This island which is nearly circular, about 7 miles in diameter and icebound, is well entitled to its name, and is a very extraordinary production of nature; it is a volcanic formation, its shores on either side having pumice stone with other substances indicating its origin; there are also several hot springs, some of which are of a temperature sufficient to boil an egg. Streams of water at a temperature of 140° to 160° F. were also found issuing from the side of the hills in some places and running into the basin, the water of which was scarcely above the freezing point.

The land is high and bold on every side, particularly the north, which has an elevation of 800 feet; there is a narrow opening of about 200 yards in width on the SE. side leading into a capacious basin named port Foster, which is the best harbor of those known in these islands; it is about 5 or 6 miles across and 97 fathoms in depth. At the entrance the soundings are 3, 4, and 7 fathoms water, increasing very rapidly as the basin is entered to 18, 27, 32, and then no bottom at 60 fathoms. On the NW. side of the basin, NW. from the entrance, there is a fine cove capable of containing several vessels, in about 4 or 5 fathoms water, clay bottom.

Deception island was one of the pendulum stations of Capt. Foster in the *Chanticleer*, in January, 1829, and it is generally supposed that this basin was formerly the crater of a volcano, and that the sea has found its way into it by washing out the narrow passage by which the *Chanticleer* entered. How long it had been resorted to by sealing vessels is unknown.

The examination of the basin by the officers of the *Chanticleer* was attended by considerable difficulty, owing to the small ashes and dust which were carried into it from the island. Not the slightest verdure exists on the island; seals, sea leopards, and penguins were seen.

Smith island, lying 40 miles west of Deception island, was first visited by Capt. Weddell, who described it as the highest and most forbidding of all the South Shetlands. Capt. Foster, in the *Chanticleer*, visited this island in January, 1829, and found it covered with snow, excepting on the sides of the precipices and on the faces of the rocks, where it could not lie, and these, from their black appearance, presented a striking contrast with the high snow-clad land. The highest point of Smith island Capt. Foster named mount Beaufort, but it is now more generally known by the name of mount Foster, and calculated to be 6,600 feet above the sea level; its summit is in latitude 63° 2′ S., longitude 62° 47′ W.

Louis Philippe and Joinville land.—Southward of the South Shetlands, and separated by a broad and deep channel named Bransfield strait, are Joinville island, Louis Philippe land, Trinity land, Hoseason island, Graham land, etc., of which very little is known except that the land is very high, mountainous and barren, and generally covered with snow; all this land lies to the south and west of the South Shetlands. In 1821 Powell discoved Trinity land, south of the Shetlands; Palmer, an American, discovered a coast line west of Trinity land; and the Russian navigator, Bellingshausen, discovered Alexander's land SW. of Palmers land. In 1823 Weddell tried to find land east of the meridian of the Shetlands. He did not find land, but succeeded in advancing as far south as latitude 74° 15′ S., where he found a sea clear of ice.

Louis Philippe and Joinville land, which forms the eastern part of the southern side of Bransfield strait, was discovered by Admiral D'Urville, of the French navy, in 1838, and was visited and examined by Capt. Ross in 1843. "On the 27th February, 1838," remarks the admiral, "after a long stretch toward the south through much ice we came upon these mysterious lands, and, in spite of the complicated obstacles against which we had to contend, both on account of the continued bad weather and from the fog and ice, in the space of about eight days we succeeded in tracing their outline for a distance of about 120 miles between 63° and 64° south latitude. The land, which is crowned with immense peaks, is covered with perpetual snow of an unknown depth. Were it not for the black rocks rendered visible by the melting of the snows which form their limits on the coast one would scarcely be able to distinguish them from the numerous fields of surrounding ice."

Biscoe islands.—Adelaide island, discovered by Capt. Biscoe in February, 1832, is one of a chain of islands lying in a NE. and SW. direction, fronting Graham land, and named Biscoe islands. The island is about 8 miles long, east and west, and its center is in latitude 67° 13′ S., longitude 68° 15′ W. It has a most imposing and beautiful appearance, with one high peak shooting up into the clouds, and occasionally appearing both above and below them. A lower range of mountains extend about 4 miles from north to south, having only a thin covering of snow on their summits, but toward their base, buried in a field of snow and ice of the most dazzling brightness, which slopes down to the water and terminates in cliff 10 or 12 feet high, riven and splintered in every direction to an extent of 200 or 300 yards from its edge.

At a distance of 3 miles no bottom was found at 250 fathoms, and round all the Biscoe islands the depths are considerable. One, named Pitt island, in latitude 65° 20′ S., longitude 65° 38′ W., has many bays, and forms, with the mainland behind, a good harbor for shelter. No living animal was found on any of the Biscoe islands, not even birds, although only a few miles to the northward they were numerous.

Tides.—The following remarks are from information supplied by Capt. Robert Fildes, of Liverpool:

"On the north coast of the South Shetlands the tides are very irregular, being sometimes high water for twenty-four hours together; at others it flows tide and half tide, and remains for about three or four hours high water, and then ebbs again, though there is in general one flood and one ebb every twenty-four hours. Gales of wind sometimes elevate the tide much above its natural level, which may account in some measure for many skeletons of whales which lie in some places at least 12 or 14 feet above high water mark, and many yards from the sea shore. In Blythe bay, Desolation island (latitude 62° 26′ S., longitude 60° 12′ W.), an easterly gale will raise the water considerably above common height; and the brig *Lady Troubridge*, that drove ashore on Christmas day, 1820, was found in the next season forced up nearly high and dry. Near the entrances of Bransfield strait the tidal streams run very strong, and in various directions, which makes the navigation in light winds both unpleasant and dangerous. The flood stream on the coast sets to the eastward.

"In a SW. gale, also in an easterly gale, the current has been found to set directly to windward at a distance of fully 3 miles from the coast. During an easterly gale the ship *Indian* drove 30 miles to the westward, and the brig *Williams*, though lying-to, drove up 20 miles to the eastward and directly to windward during ⅔ of the distance, which evidently showed that the two vessels had received the impulse of two contrary streams.

"From the observations which have been made it is inferred that the flood and ebb streams in moderate weather run eastward and westward for a distance of about 6 miles from the outer points of the land, taking the sweep of the bays; but it must be understood that under certain conditions the streams run much longer both ways, and with more velocity than at other times; the distance from the coast also varies. Outside these limits the current has been found to run with the wind at the rate of a mile an hour.

"From the above remarks it clearly shows that it is at present not easy to give a satisfactory account of the tides so as to reduce them to anything like a regular theory. One circumstance, however, may be worthy of notice: Fragments of the wrecks of the *Cora* and *Clothier* were all invariably drifted to the westward, cape Shirreff and the north beaches being scattered all over with them, but not one single particle was found to the eastward. The *Cora's* remains were easily identified, being either of cedar or mahogany. Southeastward of Joinville island it is pretty generally admitted that the motion of the water is, on the contrary, toward the eastward and carrying with it large quantities of ice."

Winds.—The same authority remarks:

"Nearly all the misfortunes that have happened in South Shetland have been in gales of wind from the eastward, which frequently prevail here, and blow with tremendous fury, generally accompanied by heavy falls of snow. No less than seven vessels have been lost, and all with easterly gales, except the *Clothier*, an American, which struck on a sunken rock. In the years 1820, 1821, and 1822 four-fifths of the gales were from the eastward, though we had all looked for harbors sheltered from the westward, under the impression that we should have most to fear from that quarter.

"In fine weather the winds from SW. and NE. are about equal in duration, not keeping long in either quarter. Indeed, with few exceptions, the winds blow along the land, which renders this coast far less dangerous when under sail than it would otherwise be. The southwesters here, very much like the northwesters at home, are attended with a fine, clear sky, and generally sweep away all the fog and sleet of the light northwesters. In two seasons I recollect only one gale from the NW. which was very heavy. I was then at Blythe bay, and it was perfectly smooth, though the sea outside was in a manner overwhelming.

"It would appear, if a parallel may be drawn from these two seasons, that gales of wind on the land are very unfrequent. I have noticed that the wind on the land is generally light, with thick dirty weather; however, the gales of wind after the middle of February begin to increase in strength, and it is then not worth while remaining on the coast. Were I bound round cape Horn, and to meet with adverse winds, I would not keep hugging the wind and tacking with every slant, but run a little free, and keep my reach to the southward, when I should be sure not to be long without an easterly wind, and gain such an offing from the western part of Tierra del Fuego as to make for me a SW. wind a fair one."

The seamen should of course study the ice chart in adopting this route.

On approaching South Shetlands from the northward Livingston, or the main island, will appear in mountains of vast height, and covered entirely with snow, the bases of them terminating in perpendicular ice cliffs. On this side of the group, in latitude 62° 20′ S., longitude 59° 50′ W., is a small isle named Table island, which is by far the most remarkable hereabout, and will always be an infallible mark for anyone approaching, as it is not possible to mistake it for any other land. Its top appears perfectly level, and its sides resemble a wall. In the upper part of its NE. end is a chink or division, which from some directions may be seen. All strangers are recommended to make this their landfall, particularly in the early part of the season, for then the land is not so easily made out on account of its snow covering, and which may at times deceive those best acquainted.

INDEX.

A.

	Page.
Aba da Lago valley	190
Abari river	26
Abiahi river	146
Abrahão point	238
Abreu de Una village	164
Abrolhos channel	208
Abrolhos channel, caution	209
Abrolhos channel, directions	209
Abrolhos islets	206
Abrolhos islets, anchorage	207
Abrolhos islets, light	207
Abrolhos shoals	208
Abrolhos shoals, tides	208
Acara-assu island	90
Acara island	104
Acaracu bank	122
Acaracu river	122
Acaracu river, buoy	122
Acarahi river	187
Acari mountain	1
Acari sierra	14
Acarouni river	39
Acaya point	238
Acejutibiro lake	143
Acertada islet	364
Adam mount	390
Adelaide island	440
Adonis banks	76
Adventure bay	410, 435
Adventure harbor	410
Adventure sound	410
Adventure sound, tides	411
Afila, punta de	282
Afila rocks	282
Afogado bank	156
Afogado village	158
Agents, Hydrographic Office	490
Agha mount	217
Agoa point	225
Agua Maré river	130
Agua Maré village	130
Aguilones islands	365
Aimable rock	44
Aimores mountains	212
Alagadas reef	195
Alagados channel	211
Alagados de Japaratuba rocks	166
Alagados opening	166
Alagados river	130
Alagoas province	167
Alagoas town	169
Albardon coast, caution	269
Albardon de Juan Maria coast	268
Albatross shoal	131
Albemarle port	433
Albemarle rock	433
Albrahao bay	237
Albrahao bay, wreck	237
Alcantara town	107
Alcantara town, light	111
Alcatrasses islands	241
Alcobaça	205
Alcobaça bar	205
Alcobaça village	205
Alegre port	268
Alegre port, anchorage	268
Alegre port, lights	268
Alexanders land	440
Alexandra colony	327
Algoas road	112
Ali rocks	370
Allegres hill	118
All Saints bay	176
Almas bank	108
Almeirim	90
Almescar mount	147
Almofala village	123
Alta punta	337
Amakura river	6
Amapa bar	65
Amapa river	65
Amaracao	121
Amaracao, tides	121
Amarga point, light	305
Amargoso river	130

Page.
Amazon river, 67, 90
Amazon river, bore, 71
Amazon river, caution, 104
Amazon river, climate, 68
Amazon river, currents, 69
Amazon river, directions (Pará branch), 83, 85
Amazon river, directions (above Pará), 93
Amazon river, directions, eastern mouth, Pará river, 75
Amazon river, directions southern branch, 74
Amazon river, electricity, 68
Amazon river, general description, 67
Amazon river, height of, 69
Amazon river, lights, 87
Amazon river, main entrance, 72
Amazon river, pilots, 75
Amazon river, pororoca, 71
Amazon river, river distances, 97
Amazon river, route up, 87
Amazon river, seasons, 68
Amazon river, temperature, 68
Amazon river, tides, 69
Amazon river, tributaries, 94
Amazon river, upper navigation, 97
Amazon river, western branch, 72
Amazon river, winds, 68
Amazon shoals, 42
Amazonas, the, 67
Ambrose shoal, 106
Anajaer point, 103
Anceada point, 259
Anchor inlet, 431
Anchor islets, 223
Anchorage bay, 369
Anchorage bay, tides, 369
Anchorstock hill, 337
Ancora islets, 223
Andres head, caution, 334
Andres head, tides, currents, 334
Anegada bay, 344
Anegada bay, sandbanks, 344
Angra point, 225
Angostura, 9
Angosturita point, 7
Anhatomirim islet, 256
Anhatomirim islet, anchorage, 257
Anhatomirim islet, light, 256
Anil river, 109
Anil river, gridiron, 110
Animas point, 283
Animas sierra, 278

Page.
Anne shoal, 371
Antonina bay, 247
Antonio point, 328
Antony creek, 427
Antunes point, 164
Anxious pass, 420
Apa river, 328
Apruage river, 49
Apruage river, current, 49
Apruage river, tides, 49
Apurimac river, 96
Aqui river, 192
Arabian, or Aroabishi, coast, 12
Arabian coast, current, 13
Arabian coast, danger, 13
Arabian coast, landing, 13
Aracaju mount, 171
Aracaju port, 171
Aracari river, 193
Aracati, 128
Aracati river, 127
Aracati Assu river, 123
Aracati Mirim river, 123
Aracuahi river, 194
Araguari rio, 66
Aranguera reef, 206
Aranhas islets, 254
Arantaha peak, 127
Arapiranga island, 88
Araquary channel, 249
Araras islet, 259
Araripe reef, 194
Araripe river, 151
Araruama lagoon, 223
Ararupira rivulet, 245
Aratuba point, 181
Arca reef, 205
Arcatiba point, 238
Arce island, 365
Arch islands, 433
Arch road, 433
Archimedes bank, 307
Arècife point, 278
Arècife road, 274
Areia point, 109
Areia shoal, 236
Areias village, 90
Argent mount, 50
Argentine mount, 378
Argentine Republic, 294
Argentine Republic, climate, 294
Ariadne island, 341
Arido islet, 191
Ariquinda rivulet, 162

Page.

Aristazabal cape ... 370
Aristazabal cape, caution ... 370
Aritiba point ... 238
Armacao bay ... 222
Armacao village ... 241
Armina ... 38
Arpour point ... 240
Arredondo bay ... 368
Arrombados river ... 130
Arrow harbor ... 408
Arrow island ... 408
Arroyo del Capitan ... 305
Arruans island ... 74
Artilleria point ... 290
Arvoredo islet ... 253
Arvoredo islet, light ... 254
Assu river ... 130
As Torres town. *See* Torres.
Astrolabe bank ... 307
Asuncion ... 330
Asuncion point ... 335
Asuncion point, shoal off ... 335
As Villas island ... 184
Atalaia point ... 101
Atalaia point, light ... 101
Atalaya point ... 297
Atapuz point ... 149
Atlas point ... 363
Aturia pass ... 89
Aturia point ... 89
Aurora ... 16
Aurora islands ... 435
Azeda point ... 169
Azul mount ... 127

B.

Bacopary cape ... 143
Badejo islet ... 254
Bahia (San Salvador) ... 176
Bahia, anchorage ... 177
Bahia, banks ... 177
Bahia, buoys ... 177
Bahia, climate ... 53
Bahia, coal ... 178
Bahia, communication ... 178
Bahia, directions ... 179, 180
Bahia, electric cables ... 178
Bahia, lights ... 179
Bahia, patent slip ... 178
Bahia, port charges ... 178
Bahia, province ... 176
Bahia, signals ... 178
Bahia, supplies ... 178
Bahia, tides ... 179
Bahia, town ... 176

Page.

Bahia Blanca ... 340
Bahia Blanca, anchorage ... 340
Bahia Blanca, buoyage ... 338
Bahia Blanca, caution ... 339
Bahia Blanca, coal ... 340
Bahia Blanca, directions ... 339
Bahia Blanca, dues ... 340
Bahia Blanca, light ... 337
Bahia Blanca, main channel ... 338
Bahia Blanca, pilots ... 337
Bahia Blanca, supplies ... 340
Bahia Blanca, tides ... 341
Bahia Blanca, town ... 340
Bahia Blanca, water ... 341
Bahia Blanca, winds ... 341
Bahia Blanca, wrecks ... 337
Bahia de Todos os Santos ... 176
Baixa Grande shoal ... 163, 166
Baixia Pequena ... 163
Baixo da Fora ... 198
Baixo Grande ... 163, 177
Baixo Grande shoal ... 216
Baixo Pequeno ... 213
Baixo shoal ... 167
Baixos de Japú ... 170
Baixos de Lucena ... 144
Bajos point ... 357
Bajos point, rocky patches off ... 357
Balcas rocks ... 246
Bald island ... 430
Bald road ... 430
Balea rock ... 213
Baleine point ... 205
Balique island ... 73
Balique island, anchorage ... 73
Balique island, light ... 73
Ballena point ... 278
Ballena sierra ... 277
Banana point ... 238
Banco Marajo shoal ... 208
Banda Oriental ... 270, 285
Banda Oriental, general description ... 270
Barbara point ... 31
Barcellos town ... 186
Barima point ... 6
Barra Bertioga ... 241
Barra Camamú ... 187
Barra Campos ... 219
Barra Canaveiras ... 193
Barra Canaveiras bay ... 240
Barra Carvalhos ... 184
Barra Enseada ... 185
Barra Falsa ... 181
Barra Falsa, buoy ... 181
Barra Frade ... 200

Page
Barra Furado 220
Barra Gamella Santa Anna village 161
Barra Grande 165
Barra Grande village 166, 186
Barra Guaratiba 234
Barra Iguassu 220
Barra Jangadas 158
Barra Lagoa 260
Barra Nova 171, 223
Barra Paranagua 246
Barra Rio Formosa village 161
Barra Rio Marineiro 193
Barra Santa Cruz 235
Barra São João 222
Barra Serinhaem village 161
Barra Superaguy 247
Barra Tutoia 120
Barra Velha 205
Barra Velha d'Igueraçu 120
Barraccas 301
Barragan bay 297
Barragan bay, lights 299
Barrancas 6
Barredro 328
Barreira de Tahua 202
Barreiras de Cahy 202
Barreiras d'Imbossuaba 202
Barreiras de Miriri 143
Barreiras de Prado 203
Barreiras de Porto Seguro 198
Barreiras de Siry 217
Barreiras island 79
Barreiras Velha 212
Barreiros town 165
Barren island 413
Barren reefs 413
Barreta de Canindé 166
Barriga mount 168
Barrow harbor 410
Bartika station 14
Basin bank 366
Bassuras bay 283
Batavia settlement 31
Batuba, anchorage 259
Batuba, bay 259
Batuba, coal 259
Batuba, light 259
Batuba, pier 259
Batuba, point 259
Batumirim bay 239
Baxio Grande islands 90
Bay. (*See* proper name.)
Bay of Harbors 412
Bay of Harbors, tides 413
Bayne river 13

Page
Beach point 403
Beacon point 430
Beagle bluff 378
Beagle rock 373
Bears rump 32
Beauchêne island 412
Beaufort mount 440
Beaumanoir reef 291
Beaver harbor 429
Beaver island 429
Béhague point 49
Belair estate 22
Belen bluff 353
Belgrano port 337
Belgrano port, anchorages 329, 340
Belgrano port, buoyage 338
Belgrano port, caution 339
Belgrano port, channel to inner port 339
Belgrano port, coal 340
Belgrano port, dangers 338
Belgrano port, directions 339
Belgrano port, dues 340
Belgrano port, gateway 338
Belgrano port, light 337
Belgrano port, main channel 338
Belgrano port, north shore 337
Belgrano port, pilots 337
Belgrano port, south shore 337
Belgrano port, supplies 340
Belgrano port, tides 341
Belgrano port, village 305
Belgrano port, water 341
Belgrano port, winds 341
Belgrano port, wrecks 337
Bella Vista 331
Bellaco rock 377
Belle Poule bank 210
Belmonte town 194
Benevente bay 216
Benevente bay, anchorage 216
Benevente bay, directions 216
Benevente bay, tides 216
Benevente point 216
Bense harbor 425
Bense islands 425
Bentiva islets 73
Berebice river 26
Berebice river, directions 27
Berebice river, lights 27
Berebice river, pilots 27
Berebice river, tides 27
Bergantines channel 292
Berkeley sound 396
Berkeley sound, tides 397
Bermeja head 353

Page.
Bertioga rio ... 241
Biberibe rio ... 154
Biche isle ... 50
Billy rock ... 398
Bird island ... 331
Bird islet ... 377
Biscoe islands ... 440
Bisson reef ... 273
Bixo point ... 246
Black Head rock ... 365
Black point ... 281, 334
Black rocks ... 407
Blanca islets ... 365
Blanca lagoon ... 275
Blanco cape ... 371
Blanco cape, tides ... 372
Bleaker island ... 409
Blind island ... 413
Blue Jacket bank ... 14
Bluff head ... 409
Bluff point ... 28
Blythe bay ... 441
Boa Esperanza ... 98
Boa Ventura village ... 193
Boa Viagem point ... 154
Boa Viagem village ... 158
Boa Vista ... 154
Bobitanga channel ... 249
Bobo bar ... 163
Boca Campana ... 328
Boca del Infierno ... 11
Boca Grande, Orinoco river ... 6
Boca Guazu ... 327
Boca Mini ... 305
Boca Riachuelo ... 302
Bodie creek ... 406
Boerasiri bank ... 14
Boerasiri creek ... 17
Boessel creek ... 14
Boi island ... 213
Boi islet ... 223
Bold point ... 403
Bolivar ... 9
Bolsas rio ... 120
Bom Abrigo ... 245
Bom Jardin island ... 92
Bom Jesus village ... 150
Bombas point ... 254
Bomfim convent ... 179
Bomfim point ... 109
Bomfim suburb ... 176
Bonnet rocks ... 43
Bonnie island ... 31
Boqueirão channel ... 109
Boquerão channel ... 195, 206

Page.
Boquerão Grande channel ... 195
Boquerão Pequeno channel ... 195
Borja ... 94
Bossnti point ... 73
Bougainville cape ... 395
Bougainville creek ... 397
Bourda mount ... 44
Bourda mount, semaphore ... 45
Bourgeois rocks ... 39
Bouverie bank ... 269
Boypéba island ... 184
Boypéba paps ... 185
Boypéba Velha village ... 184
Bragança bank ... 75
Bragança bank, buoy ... 75
Bragança bank, foul ground northeast of ... 75
Bragança bank, lightvessel ... 75
Braams point ... 36
Branca island ... 238
Branca islet ... 222
Branchwacht ... 37
Branco cape ... 46
Branco mount ... 99
Branco river ... 94
Brand point ... 12
Brandsfield strait ... 440
Brava point ... 284
Brava point, light ... 284
Braza river ... 160
Brazil ... 52
Brazil, climate ... 53
Brazil, currents ... 59
Brazil, customs rules ... 64
Brazil, general description ... 52
Brazil, inshore currents ... 60
Brazil, outlying banks ... 209
Brazil, productions ... 52
Brazil, quarantine regulations ... 64
Brazil, races ... 52
Brazil, remarks ... 99
Brazil, temperature ... 54
Brazil, winds ... 55, 57, 58
Brazil coast, caution ... 138
Brazil coast, offlying islands ... 133
Brazil coast, rocks ... 183
Brazil coast, routes ... 61
Brazil coast, soundings ... 61, 64, 99
Brazil, north coast, directions ... 3
Brazil, north coast, tides ... 100
Brazil, north coast, winds ... 60
Brazilian Guiana ... 66
Brazo de Barima ... 6
Brejo river ... 164
Brenton lock ... 416

Page.
Brett harbor 422
Breu Pargos islet 223
Breves pass 89
Breves village 89
Bridgman island 439
Brightman inlet 342
Brightman inlet, directions 342
Brightman inlet, supplies 342
Brightman inlet, tides 342
Bristol island 437
British Guiana 5
Brito mount 164
Broad channel 346
Brook settlement 31
Brothers islets 134
Brum fort 154
Buceo point 2 2
Buckle bank 102
Buen Viage reef 283
Buena Vista hill 271
Buenos Aires 300
Buenos Aires, anchorages 302, 303
Buenos Aires, caution 303
Buenos Aires, climate 294
Buenos Aires, coal, supplies 301
Buenos Aires, directions 311, 313
Buenos Aires, docks 301
Buenos Aires, harborworks 301
Buenos Aires, landing 304
Buenos Aires, lights 302
Buenos Aires, pilots 280
Buenos Aires, port charges 302
Buenos Aires, quarantine 304
Buenos Aires, tides 304
Buenos Aires, true bearing 301
Buenos Aires, winds 304
Buenos Aires, wrecks 303
Bujura point, light 268
Bull cove 412
Bull point 412
Bull road 408, 412
Bump shoal 282
Buraco fort 154
Buranhen rio 198
Burdwood bank 434
Burnside 30
Burnt harbor 422
Busbridge bank 210
Busios bay 222
Busios bay, anchorage 223
Busios cape 222
Busios islets 222, 240
Busios point 142
Bustamente bay 369
Button island 411

Page.
Byron shoal 371
Byron sound 422

C.

Cabeça de Coco, buoy 155
Cabecudo point 252
Cabedello village 145
Cabedello village, communication 145
Cabello da Velha bay 106
Cabeza do Meio 76
Cabeza do Norte 76
Cabeza do Sul 76
Cabo bank 296
Cabo del Sur 366
Cabo do Norte 66
Cabo Frio village 225
Cabocolas reef 206
Cabral bay 195
Cabral bay, anchorage 196
Cacão reef 140
Cachipour cape 65
Cachipour river 65
Cachoeira river 191
Cachoeira town 181, 198
Cagada island 231
Cagada reef 231
Caia Cangossu point 288
Caiçara village 131
Caiçara village, tides 131
Caimen village 362
Cairoçu point 239
Caïté bay 102
Caïté islets 103
Caixa Pregos point 181
Caixao de Una 164
Caixao reef 165
Cajary islands 74
Cajetuba bay 100
Cajetuba island 100
Cajetuba islet 73
Cajetuba point 100
Cajuas bank 129
Caju branch 120
Calcanhar cape 130, 138
Calçoes Fora 203
Caldeiroes island 92
Calebasse creek 66
Calhabouco point 229
Calhabouco point, light 231
California shoal 208
Calista islands 416
Calladas shoals 209
Calsoene river 65
Camamú 185

Page.
Camamú, anchorage 187
Camamú, directions 187
Camamú, island 186
Camamú, rio 187
Camamú, supplies 187
Camamú, tides 187
Camaragibe river 166
Camaragibe river, anchorage 167
Camaratuba river 143
Camaron bank 302
Camboa point 160
Cambriu anchorage 253
Cambriu point 253
Cambriu river 253
Cameron bank 28
Camerones bay 364
Cametá 88
Cametá, communication 88
Cametá, tides 89
Camocim point 121
Camocim river 121
Camocim river, bar 122
Camoropim river 142
Campana 328
Campana river 328
Campas bay 164
Campexe isle 254
Campina Grande 165
Campinho point 187
Campinhos village 186
Campiro mount 147
Campo Bon rock 260
Campos 215
Campos mount 218
Campos town 219
Canal Entrada 298
Canal Infierno 321
Canal Lateral Oeste 298
Canal Reunion Este 298
Canal Reunion Oeste 298
Cananea bay 245
Cananea bay, anchorage 245
Cananea bay, light 245
Cananea island 244
Cananea point 245
Cananea river 245
Cananea town 245
Canarias branch 120
Canaveiras point 193
Canaveiras town 193
Canavieiras branch 120
Canavieras point 240
Candeias bar 158
Candeias point 158
Candeias village 158

Page.
Candlemas isles 437
Cangréjo bank 6
Cangréjo island 6
Cangrejos rocks 368
Cangussu island 267
Cangussu pass 268
Caninde river 120
Canje point 26
Canje river 26
Canoca point 106
Cantor point 358
Capara bar 244
Cape. (*See* proper name.)
Capibaribe rio 154
Capibaribe-merin river 148
Capim island, light 87
Capitan branch 328
Carahipe river 212
Carapaporis channel 65
Carapatitiva island 106
Carapato branch 120
Carapebu shoal 213
Carapuca islet 236
Carauassu island 103
Caravellas bank 211
Caravellas channels 211
Caravellas harbor 211
Caravellas river 211
Caravellas river, tugs 212
Caravellas river, tides 212
Caravellas tree 205
Carbonero sierra 277
Carcass island 422
Carcass reef 422
Cardal lagoon 275
Cardinals hat 171
Cardos island 258
Cardoz mount 245
Carenage 397
Carew harbor 427
Caridad point 74
Carimaré mount 49
Carmes church 85
Carmo point 77
Carocos bank 186
Caro di Mato point 102
Caroline isles 50
Caroni river 10
Carrapixo mount 149
Carretas point 282
Carretas rocks 282
Carro point 102
Carysfort cape 396
Casamayor point 371
Cascades river 46

Page.
Cascarella mount 127
Cascas islet 259
Casiguiare channel 67
Cassard channel 77
Castelhanos point 184, 237
Castellanos island 184
Castellanos point 218
Castello mount 228
Castilho islet 245
Castillo bay 272
Castillo bay, caution 274
Castillo cape 271
Castillo cape, anchorage 2.2
Castillo cape, pilots 271
Castillo cape, tides 274
Castillo Grande islet 272
Castillos Chicos rocks 269
Castillos point 368
Castillos rocks 273
Castle hill 232
Castle rock 331
Castro point 361
Catalina channel 303
Cattle point 412
Catuáma anchorage 149
Catuáma bar 149
Catuáma bar, directions 149
Catuáma channel 149
Canipe rivulet 124
Cavalhos river 130
Cavallo reef 213
Cavallo rocks 186
Cavallos river 130
Cavallos Comprida islet 223
Cave bluff 359
Caviana island 73
Caxoeira reef 127
Cayenne 45
Cayenne, anchorage 45
Cayenne, climate 45
Cayenne, coal, supplies 45
Cayenne, directions 45
Cayenne, lights 44
Cayenne, pilots 45
Cayenne, semaphore 45
Cayenne, telegraph 45
Cayenne island 43
Cayenne river 43
Cayenne river, anchorage 46
Cayenne river, beacons, buoys 44
Cayenne river, caution 47
Cayenne river, depths 44
Cayenne river, directions 45
Cayenne river, lights 44
Cayenne river, rocks 44

Page.
Cayenne river, tides 46
Cayenne river, upper river 46
Cayëtano bay 367
Cayëtano bay, anchorage 367
Cayëtano bay, water 367
Cayëtano islands 367
Ceara bay 124
Ceara bay, anchorage 124
Ceara bay, climate 53
Ceara bay, communication 125
Ceara bay, directions 126
Ceara bay, hospital 125
Ceara bay, light 125
Ceara bay, pilots 125
Ceara bay, port charges 125
Ceara bay, rivulet 124
Ceara bay, supplies 125
Ceara bay, tides 126
Ceara bay, town 125
Ceara bay, winds 126
Ceara mirim river 141
Center island 396
Cerca bank 109
Cerro, el 285
Cerro Chafalote 277
Cerro Difuntos 277
Cerro Navarro 269, 277
Cerro Pasco 96
Cerro Salvador Grande 296
Cerro San Juan 301
Cerros de Canchaguayo 95
Cerros de la Sal 95
Cerros de San Juan 321
Cesar bank 118
Chafalote cerro 277
Chaffers gullet 433
Chaffers ledge 373
Chaffers point 374
Champlain bank 210
Chandler creek 13
Chandler flats 13
Chapada serra 181
Chaparro, punta da 322
Chapeo Virado point 79
Chapeo Virado point, light 79
Charles point 398
Charlotte cape 436
Charlotte point 42
Chartres river 425
Chateau Margaux estate 26
Chatham harbor, tides 430
Chaves village 73
Cheval Blanc rock 44
Chico bank 308
Chico bank, lightvessel 309

Page.
Chico bank, tides 309
Chico river 378
Chimbolan pass 331
Choiseul bay 392
Choiseul sound 406
Choiseul sound, tides 408
Christianburg 18
Christmas harbor 425
Christmas harbor, water 426
Christovao Pereira point, light 268
Chubut 362
Chuelo river 290
Chupat 362
Chupat river 361
Chupat river, anchorage 361
Chupat river, bar 361
Chupat river, beacon 360
Chupat river, directions 362
Chupat river, pilots 361
Chupat river, tides 362
Chupat river, Welsh colony 362
Chuquisaca 92
Chuy rio 268
Cidade Alta 176
Cidade Baxa 176
Cigueña punta 337
City bank 303
Ciudad bank 177
Ciudad Bolivar 9
Ciudad Bolivar, anchorage 10
Ciudad Bolivar, communication 10
Ciudad Bolivar, position 10
Ciudad Bolivar, supplies 10
Ciudad Bolivar, water 10
Ciudad Bolivar, winds 10
Clarence island 438
Clemente point 247
Cleopatra rock 364, 383
Clerke rocks 436
Cliff end 354
Cliff island 428
Cloven rock 135
Clump island 433
Coal island 228
Coary 97
Coati Paru 102
Coboclo rock 223
Cobras islet 229, 246
Cocal point 77
Cocoanut island 127
Coesewine river 31
Coimbra 330
Colares island, village 79
Colares rocks, light 79
Colliers rocks 429
Colonia 290

Page.
Colonia, anchorage 292
Colonia, directions 292
Colonia, lights 291
Colonia, pilots 292
Colonia, port 245
Colonia roadstead 290
Colonia settlement 250
Colorado rio 342
Colorado rio, caution 343
Colombiana village 202
Comandahy island 90
Commandatubu mountains 193
Commandatubu river 193
Commandatubu village 193
Commewine river 32
Committee bay 421
Comoxatiba point 203
Comoxatiba port 202
Comoxatiba port, tides 203
Comprida island 231
Comprida islet 223
Comprida reef 231
Conani river 65
Conceiçao church 152
Conceiçao mount 180
Conceiçao plain 180
Conceiçao village 244
Concepcion 323
Concepcion del Uruguay 323
Concepcion river 323
Conchas bay 194
Conchas point 129, 246
Conchas point, light 247
Conchas river 129
Concordia 323
Condamine mount 43
Congo river 151
Congress bank 211
Connetable islets 48
Connetable islets, anchorage 48
Connetable islets, caution 40
Connetable islets, currents 49
Connetable islets, dues 48
Connetable islets, signal stations 48
Connetable islets, supplies 48
Connetable islets, tides 49
Constitucion channel 346
Constitucion channel, directions 346
Contas cliffs 190
Contas rio 188
Contas rio, anchorage 189
Contas rio, tides, currents 189
Convent hills 381
Cook anchorage 128
Cooper isle 436
Coppename bank 30

Page.

Coppename river, 30
Coppename river, caution, 31
Coppename river, tides, 31
Coppename shoal, 31
Coqueiros point, 146
Coqueirinho point, 144
Coral bank, 108
Coral islet, 259
Coralinho serras, 171
Corcora islands, 12
Corcovado peak, 232
Corcovado mountains, 227
Cordillera, 254
Cordillera de la Sul, 95
Cordillera of Vilcañota, 96
Cordova cove, 370
Cordova ridges, 294
Corentyn river, 28
Corentyn river, bar, 28
Corentyn river, directions, 28
Corentyn river, light, 28
Corentyn river, tides, 28
Cormorant isles, 241
Cormorant shoal, 216
Corner, the, 335
Corn Stack island, 241
Coroa Alta islet, 195
Coroa Capao, 190
Coroa de San Gaetano, 78
Coroa Gaivotas, 76
Coroa Grande, 78
Coroa Grande flat, 251
Coroa island, 78
Coroa Kiriri, 77
Coroa Lavandeira, 131
Coroa Morisoca, 78
Coroa Morro island, 78
Coroa Nova, 76
Coroa reefs, 105
Coroa Secca, 78
Coroa Vermelha, 197, 206
Coronation islands, 437
Coronel, 30
Coronel island, 236
Coronilla point, 272
Corosoni mount, 40
Corosoni rocks, 40
Corralinho village, 89
Correio bank, 78
Corrientes, cape, anchorage, 333
Corrientes, town and anchorage of, 327
Corunbao point, 202
Coruripe point, river, 169
Cospatrick shoal, 48

Page.

Cospatrick shoal, caution, 48
Cospatrick shoal, clearing mark, 48
Cotinga island, 246
Cotinguiba rio, 171
Cotinguiba rio, buoy, 172
Cotinguiba rio, directions, 172
Cotinguiba rio, light, 172
Cotinguiba rio, pilots, 172
Cotovello point, 142
Cotunduba island, 231
Counamana river, 39
Counter Equatorial current, 59
Coutejuba island, light, 82
Cove islet, 239
Cow bay, 396
Cow point, 412
Coxoes island, 246
Coy inlet, 381
Coy inlet, tides, 381
Cozier creek, 13
Cozier point, 13
Crab island, 6, 26
Crab wood, 36
Cracker bay, 359
Cracker bay, anchorage, 359
Cracker bay, supplies, 359
Cramimuan rio, 201
Cramimuan village, 201
Cranmar mission, 421
Creek hills, 343
Creek island, 29, 345
Creek point, 420
Criminoso reef, 163
Criminso point, 223
Cross island, 331
Cross point, 250
Cruz bank, 118
Cruz bay, 364
Cruz point, 247
Cruz rio, 165
Cruz rocks, 253
Cufre river, 289
Cuirassier bank, 307
Cuma bay, 106
Cumberland bay, 436
Cumberland shoal, 283
Cunhahú rio, 142
Cunhas mountains, 127
Cupe point, 160
Cural islets, 248
Curiapo, 8
Curioso cape, 377
Curipe river, 50
Curitiba, 247
Curú bay, river, 124

Page.
Curú river, anchorage 124
Curua island 72, 91
Curuça island, river 100
Curuça island, banks off 100
Curuma island 89
Curumicuara point 124
Cuscuina river 12
Cuyaba river 329
Cuyaba town 91
Cuyuni river 14
Cygnet harbor 416

D.

D'Argent mount 50
Da Silva reef 106
Dañoso cape, reef 377
Danson harbor 416
Dantas mount 129
Darwin harbor 408
Darwin harbor, settlement 408
Dauntless bank 17
Dauntless creek 17
Dawes bank 186
Deception island 439
Deer island 345
Deitado hill 221
Dejacaré bay 72
Delfin point 362
Delgada point 358
Demerara river 18
Demerara river, anchorage 21
Demerara river, buoyage 20
Demerara river, caution 20
Demerara river, climate, seasons 24
Demerara river, current 22
Demerara river, directions 22
Demerara river, lights 19
Demerara river, outer bank 24
Demerara river, pilots, pilotage 21
Demerara river, rollers 22
Demerara river, tides 21
Demerara river, upper river 24
Demerara river, winds 25
Dentro channel 77
Dentro channel, directions 85
Dentro channel, tides 83
Desengaño point 377
Desengaño point, caution 377
Deserta islet 253
Desire port 372
Desire port, anchorage, tides 374
Desire port, directions, pilots 374
Desire port, settlement 373
Desire port, supplies 373
Desolation island 441

Page.
Despair rock 438
Desterro 235
Desterro, Nossa Senhora de 255
Desterro, anchorage 256
Desterro, directions 257
Desterro, coal 255
Desterro, pilots 256
Desterro, supplies 255
Desterro, telegraph 255
Desvelos bay 376
Devils creek 28
Devonshire Castle flats 13
Diable islet 41
Diable mount 41
Diamante sierra 329
Diamantino 91
Diamond point 47
Dick point 427
Diego point 223
Difuntos cerro 277
Dinero mount 383
Direction hill 355
Direction islet 407
Disappointment cape 436
Doce rio 153, 212
Doctor point 399
Dog bank 343
Dolphin cape 395
Dom Rodrigo rocks 170
Do Sul bay 79
Dos Bahias cape 365
Dos Irmãos mountains 194
Dos Irmãos village 203
Dos Irmoens island 104
Dos Parintins serra 92
Double creek 428
Doze shoal 276
Drago point 238
Driftwood point 410
Duck point 12
Dunbar islet 422
Dundas cape 437
Dunnose head 426
Dunnose head, anchorage 426
Dupont islets 44
Dutch banks 38
Dutch Guiana 28
Dykes island 331

E.

Eagle point 396
East Falkland island 395
Eagle passage 413
Eagle passage, directions 413
Eagle passage, tides 414

Page.
East bank 345
East channel 345
East cove 407
East island 403
East islet 368
East passage 237, 426
East point 21, 275, 360, 368
East point, bank 279
East point, light 275
East road 403
Eastern Lage rock 235
Eddystone rock 376, 395, 418
Edgar port 421, 433
Edgar port, directions 433
Edgar port, settlement 434
Edgar port, tides 434
Edye creek 427
Egg harbor 367
Egg harbor, tides 367
Egg islet 217
Egmont port 421
Egmont port, cays 420
Egmont port, directions 421
Egmont port, supplies 421
Egmont port, tides 421
Eighteen trees 26
El Cerro 285
El Fuerte hill 355
El Merced 352
El Rincon 335
El Rincon, directions 336
El Rincon, tides 335
Elephant bay 420
Elephant cays 414
Elephant cove 430
Elephant island 438
Elephant point 421
Embarca river 193
Embuda point 297
Emerina point 223
Emily bank 119
Encantada islet 120, 273
Encantada lake 120
Enchadas island 229
Enchadas rock 236
Enciada morro 251
Enfant Perdu rock 46
Engaño bay 361
Engineer point 399
English bay 365
English bank 156, 306
English bank, buoys 155
English bank, lightvessel 306
English point 281
English rocks 44

Page.
Enmore estate 26
Ensenada de Barragan 297
Entrance mount 378
Entrance point 379
Entre Rios 322
Equatorial current 58, 62
Ercules point 358
Erere serra 91
Escalvada islets 215
Escobar islet 368
Esmenigildo town 261
Espadon breakers 84
Espera islets 114
Espinillo point 288
Espinosa heights 371
Espinosa islet 274
Espirito Santo bay 213
Espirito Santo bay, anchorage 214
Espirito Santo bay, beacons, buoys 214
Espirito Santo bay, coal 214
Espirito Santo bay, directions 214
Espirito Santo bay, light 214
Espirito Santo bay, supplies 214
Espirito Santo bay, tides 214
Espirito Santo cape 383
Espirito Santo frade 215
Espirito Santo river 213
Essequibo river 14
Essequibo river, anchorage 18
Essequibo river, beacons 15, 17
Essequibo river, buoys 15
Essequibo river, caution 17
Essequibo river, directions 17
Essequibo river, middle bank 18
Essequibo river, middle channel 16
Essequibo river, penal settlement 14
Essequibo river, sandbanks 15
Essequibo river, ship channel 17
Essequibo river, sugar bank 17
Essequibo river, tides 21
Essequibo river, west channel 14
Estancia de la Loberia chica 333
Estancia de la Sociedad 334
Estrada das Mongubeiras 81
Estreito beach and town 261
Estrella bank 124
Estrella bay 237
Estrella bay, tides 238
Estrieto point, light 268
Ethelrust settlement 36

F.

Fabian point 365
Fairweather cape 381
Falsa barra 181
Falsa bay 341

Page.
False bay 181
False Braams point 36
False Carro di 102
False Mato point 102
False Mount d'Argent 50
False passage 426
False Salinas bay 102
False Sisters 351
False Sugarloaf 226, 232
Falkland islands 389
Falkland islands, caution 390, 393, 395
Falkland islands, barometer 391
Falkland islands, climate 392
Falkland islands, communication 393
Falkland islands, currents 392
Falkland islands, directions approaching 393
Falkland islands, harbors 390
Falkland islands, kelp 393
Falkland islands, productions 390
Falkland islands, rainfall 392
Falkland islands, thermometer 392
Falkland islands, tides 391
Falkland islands, winds 390
Falkland East, island 395
Falkland West, island 420
Falkland West, island, tides, north coast 423
Falkland West, island, directions 429
Falkland sound 415
Falkland sound, approaching 418, 419
Falkland sound, directions 418
Falkland sound, Main passage 418
Falkland sound, Swan passage 418
Falkland sound, Tyssen passage 418
Falkland sound, tides 417
Familia rocks 285
Fanning Head 418
Fanny Road, islands 411
Farallon islet 291
Farallon islet, light 291
Farol mast, beacon 321
Feia islet 222
Feia lake 220
Feijao point 121
Feiticeiras, bank 230
Felix tree 206
Fernando Noronha 134
Fernando Noronha, anchorage, supplies 135
Fernando Noronha, telegraph 135
Ferradura praia 223
Feya islet 252
Figueira islet 245
Fincudo tree 205

Page.
Findley harbor 416
First island 29
Fishers bank 291
Fishing bank 108
Fitz basin 404
Fitz cove 404
Fitzroy port 403
Fitzroy port, anchorage 403
Fitzroy port, bar 403
Fitzroy port, directions 404
Fitzroy port, East road 403
Fitzroy port, tides 404
Flamingo bay 239
Flamingo bay, anchorage, village 240
Flat islet 368, 377
Flat point 349
Flat rock 236
Flat rocks 42
Flattop hill 344
Flores island, anchorage 283
Flores island, light 283
Flores island, telegraph 283
Florida reef 364
Flybank 209
Focinho da boy 158
Focinho do Cabo point 224
Focinho do Cabo point, light 224
Fogo reef 140
Fogo town 140
Foleto point 12
Fonte Boa 97
Forest King reef 283
Formosa bay 222
Formosa bay and town 143
Formosa bay, anchorage 143
Formosa rio and town 162
Forno praia 225
Fortaleza bay 240
Fort hill 355
Fort island 14
Fort islet 257
Fort Barra Grande 242
Fort Boa Viagem 229
Fort Brum 154
Fort Buraco 155
Fort do Barra 80
Fort do Barra, rock near 80
Fort Cépérou 44
Fort Fortaleza 150
Fort Gamboa 176
Fort Gravata 229
Fort Ilha de Carvalho 243
Fort Ilha do Mel 246
Fort Itamaricá 152
Fort Lage 229

Page.
Fort Montenegro 154
Fort Nassau 26
Fort Nazareth 159
Fort New Amsterdam 32
Fort Pao Amarello, or Yellow Wood 153
Fort Picão 154
Fort Pico 229
Fort Reis Magos 141
Fort Reis Magos, light 141
Fort St. Andrew 26
Fort St. Diego 176
Fort St. François Xavier 159
Fort St. Joaquin 94
Fort San Antonio 109, 174
Fort San Marcello do Mar 176
Fort San Marcos 111
Fort San Pedro 176
Fort Santa Anna 255
Fort Santa Cruz 229, 247
Fort Santa Maria 176
Fort Santa Teresa 269
Fort São João 229
Fort Tamarandé 162
Fort Villegagnon 229
Fort William 23
Fort Zeelandia 33
Foster mount 440
Foster port 439
Foul bay 415
Fouro (pass of) Araguari 67
Fouro de Bareta 78
Fourth island 426
Fourth passage 426
Fox bay, tides 417
Fox harbor 410
Fox point 407
Frade Leopardo hill 213
Frade rio 195, 200
Francaise point 37
France shoal 208
Francesca islet 217
Francesca islet, anchorage 217
Francesca islet, light 217
Francez port 147, 169
Francez port, caution 147
Francez port, directions 147
Fray Bentos town 323
Fraylés, los 367
Fraylés, dos, point 258
Freezeland peak 437
Freixal island 91
French banks 38
French bay 365
French bay, anchorage 366
French bay, directions 366

Page.
French Guiana 37
French harbor 430
Frescas island 73
Friars hills 381
Frio cape 224
Frio cape, anchorage 225
Frio cape, light, telegraph 224
Frio cape, signal station 224
Frio cape, winds, tides, current 225
Fucinho do Cão 190
Fuerte, el, hills 355
Funil point and mount 149
Furado barra 220
Furado praia 220
Furtado island 236

G.

Gabriel point 284
Gaibú bay and village 159
Gaivotas island 76
Gaivotas island, lightvessel 76
Gajirutiva island 106
Galheta islet 247
Galhinas point 250
Galibi point 37
Galinhas bar 161
Galinhas point 161
Galinhas port 161
Galinhas village 161
Galiona isle 369
Gallegos port 381
Gallegos port, anchorages 381
Gallegos port, caution 382
Gallegos port, directions 382
Gallegos port, tides 382
Gallegos river 381
Galvez rio 95
Gamboa bank and fort 177
Gamboa village 183
Gamélla bar 162
Gamélla point 162
Gamélla village 162, 165
Gamélla Sta Anna village 161
Gauchos bay 253
Gauchos mount 253
Gauchos point 253
Gannet shoal 12
Garadier rocks 43
Garapua point 184
Garapua village 184
Garcia de Avila tower 174
Garcia point 181
Garçon lagoon 275
Garden point 404
Gato isle 257
Gavia cape 234

Page.
Gavia mount ... 232
Genipabu point and reef ... 141
George cape ... 436
George island ... 413
Georgetown ... 19
Georgetown, anchorage ... 21
Georgetown, communication ... 21
Georgetown, directions ... 22
Georgetown, dock ... 19
Georgetown, hospital ... 20
Georgetown, quarantine ... 20
Georgetown, pilots ... 21
Georgetown, port charges ... 20
Georgetown, repairs ... 19
Georgetown, supplies, coal ... 19
Georgetown, time ball ... 21
Georgetown, tug ... 21
Geriba point ... 223
Geriba, praia do ... 223
Gerimum bar ... 148
Gibralter reef ... 422
Gill bay ... 366
Gipoia island ... 236
Gizzard islet, light ... 242
Glascow ... 24
Goede Vrede plantation ... 35
Goëland rock ... 368
Goiabal islands ... 88
Goiabal pass ... 87
Goiabal pass, shoal ... 88
Goiabal village, light ... 87
Goiana river and town ... 147
Goiana river, bar ... 148
Goiana river, directions ... 148
Golding island ... 420
Gorda punta ... 282, 322
Gordon point ... 28
Gorriti island ... 278
Gostoso rock ... 149
Governor channel ... 430
Governor island ... 430
Goya ... 331
Graça islets ... 249
Graham land ... 440
Grand Jason ... 424
Grand Pará province ... 81
Grand Serpa island ... 92
Grande Coroa ... 108
Grande de Belmonte river ... 194
Grande do Belmonte river, light ... 194
Grande do Norte river ... 141
Grande do Norte river, light ... 141
Grande do Sul river ... 262
Grande do Sul, anchorages ... 264
Grande do Sul, bar ... 262

Page.
Grande do Sul, climate ... 268
Grande do Sul, coal ... 262
Grande do Sul, directions ... 265
Grande do Sul, light ... 263
Grande do Sul, pilots ... 264
Grande do Sul, signals ... 263
Grande do Sul, tides ... 265
Grande do Sul, towns ... 262
Grande do Sul, winds ... 261
Grande do Sul point ... 65
Grande ilheo ... 191
Grande punta ... 197
Grande serra ... 189
Granite point ... 278
Grantham sound ... 418
Grantham sound, tides ... 417
Grao Pará province ... 51
Gravatá point ... 164
Grave cove ... 422
Gravina peninsula ... 369
Great Amapa river ... 65
Great Coroa banks ... 78
Great Diamond estate ... 24
Great island ... 121, 411
Great North bank ... 338
Great passage ... 154
Great Porcos island ... 239
Great reef ... 124
Great Robledo islet ... 369
Great Troolie island ... 15
Green bay ... 341
Green island ... 341, 407, 436
Green island bank ... 341, 427
Green islet ... 238
Greenwich island ... 438
Gregorio bay ... 365
Grey channel ... 428
Gros Bois point ... 38
Grossa point ... 67, 129, 238, 239, 256
Guagiru point ... 118
Guahyba island ... 236
Guaira fall ... 324
Guajara river ... 87
Guajara river, light ... 87
Guaju river ... 143
Gualeguaychu river ... 323
Gualeguaychu town ... 323
Guama river ... 83
Guanacos point ... 367
Guandú river ... 235
Guaporé river ... 93
Guarabas island ... 79
Guarajá ... 93
Guarapari islets and rivers ... 215
Guaratiba cape ... 234

Page.
Guaratibas point 205
Guaratibas reef 204
Guaratuba bar 248
Guaratuba bay, village 249
Guarau islets 244
Guarau point 244
Guarazes rocks 257
Guarita islet 207
Guatemala mount 43
Guayma bank 12
Guayma river 12
Guayma river, caution 12
Guayma river, tides 12
Guayma shell beach 13
Guayra waterfall 328
Guazu mouth 322
Gueguen river 334
Guia point 146
Guiana 1
Guiana, climate 5
Guiana, current 2
Guiana, directions 3
Guiana, discolored water 3
Guiana, mud bank 2
Guiana, rollers 2
Guiana, route to windward 3
Guiana, soundings 1
Guiana, tides 1
Guiana, trees 2
Guiana, winds 4, 60
Guiana, Brazilian 66
Guiana, British 5
Guiana, British, climate 5
Guiana, British, communication 6
Guiana, Dutch 28
Guiana, Dutch, climate 5
Guiana, Dutch, communication 6
Guiana, French 37
Guiana, French, climate 5, 45
Guiana, French, communication 6
Guiana Vieja 11
Guimarens river 106
Guisanbourg 49
Gulf of St. Vincent shoal 360
Gull harbor 428
Gull islet 369
Gull point 422
Gurgueia river 120
Gurijuba 72, 210
Gurita rocks 257
Gurupá branch 90
Gurupá island 74, 90
Gurupá village 90
Gurupi bay 104
Gurupi cape 103

Page.
Gurupi cape, caution 103
Gurupi island 104
Gurupi river 104

H.

Halftide island 366
Halfway cove 414, 427
Halfway cove, tides 428
Halt island 410
Hampton Court estate 13
Hampton Court landing 13
Harbor isle 365
Harbor reef 125
Hare island 408
Harriet port 402
Harriet port, bar, harbor 402
Harriet port, directions 403
Harriet port, outer anchorage 402
Harriet port, tides 403
Harston mount 421
Hellgat bank 345
Hermeneg point, coast near 334
Hermes rock 221
Hermoso mount 337
Hermoso mount, light, signals 337
Hermoso mount, pilots 337
Hernandaria point 327
Herrideros rocks 324
Herstelling estate 24
Hibiapaba rocks 121
Hidden islet 362
High Cliff island 418
Higueritas, las 322
Hill cove 422
Hill gap 415
Hilly point 376
Hogarth bank 210
Hog island 397
Hole in the Wall 134
Hope harbor 422
Hope harbor, caution 424
Hope harbor, tides, directions 423
Hope point 424
Hornby mountains 415
Horn spit 338
Hornos islands 292
Hornos islands, anchorage 293
Hornos islands, rock west of 293
Horse Block islet 430
Hoseason island 440
Hoste inlet 432
Hotspur bank 209
House cove 434
Howard port 417
Hoy island 16

Page.

Huallaga rio 96

Huanuco city 96

Humaita 330

Hummock island 425

Hurtado mount 335

Hut point 395

I.

Iaburu island 72

Ica rio 94

Icebergs 387

Igarapé Grande river 77

Iguapé cape 127

Iguapé river and beach 244

Iguapé town 244

Iguaraçu river 151

Iguassu barra 220

Ilha bar 150

Ilha bar, anchorage, directions 151

Ilha Barra reef 163

Ilha Carvalho fort 243

Ilha Cobras 229

Ilha dos Bois 170

Ilha Grande 237

Ilha Grande, signal station 237

Ilha Grande bay 236

Ilha Grande bay, anchorages 237

Ilha Mel 246

Ilha Mel, light 247

Ilha Palma de Guaratiba 234

Ilheo Grande 191

Ilheo Pequeno 191

Ilhéos 189

Ilhéos bay 191

Ilhéos river 191

Ilhéos river, anchorage 191

Ilhetas point, river 164

Ilhota point 255

Ilhota port 150

Iman point 281

Imaruy lagoon 260

Imataca 11

Imataca river 11

Imbe serra 215, 220

Imbetiba 221

Imbetiba, piers 221

Imbetiba, pilots 222

Imbituba bay, anchorage 259

Imbituba bay, coal 259

Imbituba bay, pier 259

Imbituba bay, supplies 259

Imbituba point 259

Imburo hill 221

Imperatriz 167

Ina point 196

Page.

Ina rock 196

Inaccessible islands 438

Indian head 343

Indio point 297

Indio point, lightvessel 297, 307

Indio point lightvessel, pilots 308

Indio point, tides 297, 309

Inferno cliffs 142

Infierno, canal del 321

Inhaman rio 152

Insuacome point 200

Ipatitinga do Norte flat 257

Ipojúca rio 160

Iracouba flat 39

Iracouba mountain 40

Iracouba river 39

Iracouba river, caution 39

Iriry mountain 221

Iriry praia 220

Irmãos islet 223

Irmoens islands 104

Island harbor 406

Islote islet 273

Itabaianna serra 171

Itabapuana rio 218

Itabapuana serra 215

Itacolomi bank 107

Itacolomi island 252

Itacalomi islets 248

Itacolomi lighthouse 111

Itacolomi morro 107

Itacolomis channel 202

Itacolomis reefs 201

Itaguaby rio 235

Itahipe rio and lake 190

Itaipebas rocks 186

Itaipins rocks 191

Itajahi river 252

Itajahi river, anchorage 253

Itajahi river, supplies 253

Itajahi river, tides 253

Itamaracá channel 151

Itamaracá island 150

Itamaracá village 151

Itämirim morro 249

Itanda island 90

Itanduba island 90

Itanhem channel 206

Itanhem channel, directions 206

Itanhem rio 205

Itapacarohy bay 252

Itapacarohy point 252

Itaparicá island, channel 181

Itaipe river 191

Itapema point 242

Page.
Itapemirim 217
Itapemirim river 217
Itapessóca mount 147
Itapiçuma village 151
Itapicuru rio 173
Itapitango rock 191
Itapuan point and light 174, 268
Itapuan river 192
Itapuanzinho point 174
Itapucu bar 252
Itaquena point 200
Itaqui point 112
Itaraça serra 192
Itassepanema reefs 195
Itayparock 181
Ituba bank 156
Itucambira rio 194
Ituquara island 89

J.

Jabaroca island 105
Jaboatão rio 159
Jacare rio 148
Jachtlust 32
Jacuman town 141
Jabura pass 89
Jaburu point 181
Jaguanão island 236
Jaguaribe hill, rock 149
Jaguaribe rio 127, 150
Jaguaribe rio, anchorage 128
Jaguaribe rio, directions, light 128
Jaguaribe rio, tides 128
Jaguaripe river and bar 181
Jaiqui port 161
Jamery river 98
Jangadas barra 158
Japara river 203
Japaratuba river 171
Japarigues islets 103
Japirica point 102
Japu hill 170
Japura river 67
Jararaca island 88
Jari river 192
Jarinta point 90
Jaseur bank 210
Jason islands 424
Jason islands, tides 423
Javario rio 95
Jequitinhona rio 194
Jericoacoara basin, supplies 122
Jericoacoara basin, tides 122
Jericoacoara hills 122

Page.
Jericoacoara point, anchorage 122
Jetuba island 80
Jicu cape 215
Jiguia lake 167
Jipioca island 66
Jiquié river 183
Joacema anchorage 200
Joacema anchorage, directions 201
Joacema point, reefs 200
Joannes point 77
Joannes point, light 77
Joannes village 77
João da Cunha island 253
João da Cunha rocks 130
João Goncalves bank 183
João Diaz cape 249
João Diaz cape, light 249
João Diaz point 252
João Fernandez reef 223
Joãosinho island, bay 104
Joatinga point 239
John point 408
Johnson harbor 397
Joinville island 440
Joinville land 440
Jorge Griego island 238
Josef river 334
Jouberb point 40
Juan de Leão peak 201
Juan de Tiba rio 197
Juan Geronimo mount 296
Jucurussu bar 203
Jucurussu river 203
Juia reef 163
Juncal island 295
Jundia hi rio 193
Jupati point 72
Jupati rio 72
Jurea point 244
Juricuara point 200
Jurua bank 73
Jurua river 67
Jurubatuba point 252
Jurugua village 167
Jurujuba point 230
Jurupari island 73
Jurupary island 90
Jutahy island, light 87
Jutahy serra 90

K.

Kaw mountain 47
Kaw river 47
Keel point 380
Kelp 424

Page.
Kelp bay 409
Kelp bay, anchorage 409
Kelp island 412
Kelp lagoon 406
Kelp point 417
Kent mount 405
Keppel island 421
Keppel sound 421
Keppel sound, anchorage 421
Keppel sound, directions 421
Keppel sound, supplies 421
Kidney island 409
King harbor 416
King George bay 425
King George bay, directions 425
King George island 438
Kiwakewaraba island 16
Knob islet 417
Knoll island 432
Kuru bay 42
Kuru river 42
Kuru river, semaphore 43
Kuru rocks 43
Kusewine river 31
Kweriman bank 37

L.

La Bonne Amédie rock 47
La Folle rock 43
La France shoal 208
La Granja town 122
La Laguna 98
La Paz 327
La Paz coal 327
La Plata city 299
La Plata city, anchorage 299
La Plata city, coal 298
La Plata city, directions 299, 300
La Plata city, docks 298
La Plata city, harbor works 298
La Plata city, lights 299
La Plata city, time signal 299
La Plata bank 305
Labyrinth head 342
Labyrinth shoals 341
Lage de Conceiçao 244
Lage de Santos 243
Lage do Cacao 258
Lage dos Pescadinhas 257
Lage dos Tres Henriques 257
Lage eastern 235
Lage fort 229
Lages de Mechy 170
Lagoa de Jiguia 169
Lagoa do Norte 168

Page.
Lagoa dos Patos 267
Lagoa dos Patos, lights 268
Lagoa Grande 91
Lagoa Manguaba 168
Laguna islets 368
Laguna Padres 333
Laguna pass 330
Lagunas des Patos 290
Laja bank 291
Lake. (*See* proper name.)
Lake point 402
Lamaha canal 191
Lamarche, point 397
Lambaré pass 330
Lanaud peninsula 365
Laplace shoal 101
Lara bank 300
Lara Punta, anchorage, piers 299
Lara Punta, directions 300
Lara Punta road 299
Large island 410
Largo island 258
Las Tablas 7
Laurie islands 437
Lavandeira reef 131
Leading hill 319
Lecky bank 269
Lecky rock 230
Le Grand Connétable 48
Le Machoiran Blanc rock 46
Le Malingre islet 47
Le Mère islet 47
Le Père islet 47
Les Battures shoals 48
Les Battures shoals, clearing mark 48
Les Clochers 134
Les Hattes point 37
Les Hattes point, light 38
Les Jacis reef 147
Les Mamelles islets 47
Les Sommes bank 44
Lee bank 29
Leguan bank 14
Leguan island 14
Leitao point 153
Lençoes island, Little 104
Lençoes Grandes 118
Lençoes Pequenos 118
Lençol point 212
Leones channel 366
Leones isle 365
Lewthwaite island 438
Lieskoy island 437
Light, Albrolhos islets 207
Light, Alcantara 111

Page
Light, Amarga point 305
Light, Anhatomirim 256
Light, Aracaju (Cotinguiba) 172
Light, Aracati 128
Light, Arvoredo 254
Light, Atalaia point 101
Light, Bahia 179
Light, Bahia Blanca 337
Light, Barra, fort da 242
Light, Batuba point 259
Light, Belmonte 194
Light, Bom Abrigo 245
Light vessel, Bragança 75
Light, Brava point 284
Light, Buenos Aires 302
Light, Calhabouco point 231
Light, Capim 87
Light, Ceara bay 125
Light, Chapeo Virado 79
Light vessel, Chico 309
Light, Colares island 79
Light, Colonia 291
Light, Continguiba 172
Light, Cotejuba island 82
Light, East point 275
Light vessel, English bank 306
Light, Espirito Santo 214
Light, Falkland islands 398
Light, Farallon 291
Light, Flores island 283
Light, Franceza islet 217
Light, Frio cape 224
Light, Gaivotas 76
Light, Goiabal point 87
Light, Guajara island 87
Light, Hermoso mount 337
Light, Imbituba 259
Light vessel, Indio point 297, 307
Light, Itacolomi point 111
Light, Itapuan point 174, 268
Light, Jaguaribe 128
Light, Joannes point 77
Light, João Diaz 249
Light, Jutahy island 87
Light, Lagoa dos Patos 268
Light, La Plata 299
Light, Les Hattes point 38
Light, Maceio 168
Light, Mar, fort do 176
Light, Maranhão 114
Light, Martin Garcia 321
Light, Medano point 332
Light, Mocuripe point 125
Light, Moela islet 242
Light, Mogotes point 333
Light, Montevideo 287

Page
Light, Montserrat point 179
Light, morro Itacolomi 111
Light, morro São Paulo 183
Light, Naufragados point 256
Light, Olinda point 154
Light, Patos lake 268
Light, Panacuera 87
Light vessel, Panela shoal 288
Light, Pará 82
Light, Parahiba river 145
Light, Parahiba do Sul 219
Light, Paranagua bay 247
Light, Paranahiba river 145
Light, Patos lake 268
Light, Pedra do Sal 120
Light, Pedra Secca rocks 135
Light, Pembroke 398
Light, Pernambuco 154, 156
Light, Piraboca rock 174
Light, Polonio 272
Light, Rasa point 295
Light, Raza island 231
Light, Real rio 173
Light, Rio Grande do Norte 141
Light, Rio Grande do Sul 263
Light, Rio Janeiro 231
Light, Rio San Francisco do Norte 171
Light, Rocas reef 135
Light, Royale islet 41
Light, Saint Agostinho 159
Light, Saint Joseph islet 41
Light, Saint Thomé 219
Light, Saucé point 290
Light, Samôco point 171
Light, San Antonio 174, 295
Light, San João island 105
Light, San José Ignacio 275
Light, San Marcos fort 111
Light, Santa Anna island 117
Light, Santa Barbara 207
Light, Santa Catharina island 256
Light, Santa Cruz fort 231
Light, Santa Luzia 214
Light, Santa Maria cape 273
Light, Santa Maria fort 179
Light, Santa Maria Grande 260
Light, Santiago piers 299
Light, Santo Antonio, fort 174
Light, Santos 242
Light, South Barranca 351
Light, Villegagnon fort 231
Limao pass 89
Lisbonense shoal 103
List of H. O. agents 490
List of H. O. publications 485
Little Castillo 272

	Page.
Little Harbor island	412
Little island	410
Little Mamelon	124
Little Moleques	255
Little passage	155
Little Sto. Antonio river	166
Lively island, sound	408
Livingston island	438
Livramento island	107
Lixa reef	205
Lobo peak	358
Lobos bank	341, 355
Lobos head	362
Lobos isle	252, 260, 276
Lobos isle, pilots	276
Lobos islets	369
Lobos mount	253
Lobos point	285
Long islet	368, 397
Longa rio	120
Lookout point, foul ground	377
Lopez islets, road	291
Loran river	11
Loreto	97
Louis Philippe land	440
Louis port	397
Low bay	409
Low bay, tides	409
Low island	438
Low islet	422
Low mount	396
Low point	411
Loyala point	381
Lucas bay	433
Lucas mount	50
Lucas point	433
Lucena banks, point	144
Lucino point	235
Luckie	18
Lujan river	328
Luminabo isle	50
Lusignan point	25
Lusignan spit	25
Luz islet	282

M.

Macaco bank	150
Macacos island	238
Macacos pass	89
Macahé	221
Macahé rio	221
Macahé rio, tides	221
Macahé serra	215
Macapá, anchorage	74
Macapá, directions	74
Macaranduba rio	150
Macareo river	11
Macary river	65
Macan town	130
Macauba rio	194
Macbride head	396
Maceió bay or port	167
Maceió, directions	168
Maceió, pilots, light	168
Maceió, railway	167
Maceió, shoals	167
Maceió, supplies	167
Maceió, tides	168
Macouria mont	43
Macouria point	43
Macouria river	44
Madeira island	236
Madeira river	92
Madryn port	359
Madryn port, anchorage	360
Madryn port, landing	360
Madryn port, pier	360
Madryn port, railway	359
Madryn port, shoals	359
Madryn port, supplies	360
Madryn port, telegraph	359
Magari river	80
Magdalena church	313
Magdalena village	297
Magellan cove	377
Magellan strait	383
Magellan strait, caution	383
Maggie Elliot rock	401
Magoari banks	76
Magoari banks, tide	77
Magoari cape	73, 77
Mahaicoui river	26
Mahaika river	25
Mahuri river	47
Mahuri tableland	47
Mai island	230
Maiacare river	65
Maillard rock	44
Main point	349
Major rock	44
Makuri creek	14
Malaspina port	369
Maldonado	278
Maldonado bay	278
Maldonado bay, anchorage	280
Maldonado bay, landing	278
Maldonado bay, directions	280
Maldonado bay, pilots, supplies	280
Maldonado point	275

Page.
Maldonado rivulet 275
Maldonado rivulet, shoals in 279
Maldonado, southeast channel 281
Maldonado, tides 280
Maldonado, wrecks 279
Malembar tree 198
Mamanguápe river, point 144
Malmanuri flats 41
Mamauru island 91
Mamelon hill 118
Mamelon hill, Little 124
Mamo pass 7
Mamore river 93
Mamucabinha point 164
Mana 39
Mana point 34
Mana river 39
Mana river, directions 39
Manama point 50
Manamo river 12
Manaos town 94
Manaye river 97
Mancallacta 97
Mandahú anchorage, point 123
Mandahú river 123
Manduba point 241
Manejituba island 77
Mangabeira point 77
Mangaratiba bay, village 236
Mangas isle 106
Mangles point 6
Mangrove beach 118
Mangrove point 40
Mangue Secca point 173
Mangue Secco mount 130
Mangueira point 263
Mangues point 164
Mangues Seccos point 118
Mangues Verdes beach 118
Mangues Verdes point 118
Manguinha rio 197
Manguinho point 162, 171
Maniji island 102
Maniji point 102
Manjui channel 86
Manoa 11
Manoel Luiz reef 105
Manoel Luiz reef, tides 105
Manoel Luiz, shoal near 106
Manpituba river 260
Manuel point 320
Manybranch harbor 417
Mapire 11
Mar Chiquito lagoon 333
Mar Pequena de Iguapé 244

Page.
Mar Virado bay 240
Maraca island and anchorage 65
Maraca island, caution 66
Maraca island, channel 65
Maraca island, directions 66
Maraca island, tides 66
Maraca assu island 92
Maracahype point 161
Maracahype rio 161
Maracajahu reef 140
Maracaju heights 328
Maracas island 91
Maracasumé island 104
Maracuno bay 100
Maragogy river 166
Marahu river 186
Marahu village 186
Marajo island 77
Marajo river 90
Marambaia island and morro 235
Marambaia rock 235
Marambaia serras 166
Maranduba island 100
Maranhão 110
Maranhão, anchorages 112
Maranhão, buoyage 109
Maranhão, communication 111
Maranhão, directions 112, 114
Maranhão, entrance channel 112
Maranhão, gridiron 110
Maranhão, harbor 109
Maranhão, island 109
Maranhão, lights 111
Maranhão, outward route 114
Maranhão, pilotage 111
Maranhão, pilots 110
Maranhão, port charges 110
Maranhão, seasons 111
Maranhão, tides 111
Maranhão, supplies 110
Marañon river 93
Marapani point 100
Maratuba serra 249
Marau point 79
Marca cape 268
Marca cape, light 268
Marcos, village 199
Mare harbor 407
Maria Farinha point 152
Maria Farinha rio 152
Marica islets 226
Marimarituba island 91
Marinheiros island 267
Mark rock 282
Market Place point 10

Page.
Marmelos 98
Maroim town 171
Marona island 92
Maroni river 37
Maroni river, buoyage 38
Maroni river, directions 38
Maroni river, lights 38
Maroni river, tides 38
Marques point 370
Martin Chico point 320
Martin Garcia island 320
Martin Garcia, beacons, buoys, light 321
Martin Garcia, channels, directions 321
Martin Garcia, lazaretto 320
Martin Garcia, telegraph 320
Martin Garcia, wrecks 321
Martin Vas islets 137
Marubim tree 202
Marys Hope plantation 28
Masambaba 226
Massarandupio mount 174
Massaranguápe mountains 126
Massaranguápe point 140
Massaranguápe rio 141
Mata Mata pass 12
Matto de St. Cosme 118
Matto Grosso 91
Matto Grosso point 202
Matto Grosso province 324
Matto point 144
Maturi mount 43
May reef 375
Mayé mount 65
Maynique town 96
Mayru river 96
Mazaroni creek 14
Medano bank 332
Medano point, light 332
Medano point 255, 349
Medeiros rock 243
Medo island 109
Medrano rocks 369
Megaho rio 118
Meio bank 74, 108
Meio island 91
Meio islet 234, 238
Meio river 120
Meirelles banks 124
Mel, ilha do 246
Mel point 129
Melançia morro 123
Meldroza islet 283
Melo port 368
Melo port, anchorage, tides 368

Page.
Memonan village 190
Menino island 231
Merced, el 352
Mercedes town 323
Meredith cape 433
Merepe rio 160
Merim lake 268
Meros island 237
Meros shoal 237
Messo river 192
Mestre Alvarez mount 213
Metappica creek 37
Mexados islet 73
Mexiana island 73
Mid island 413
Mid rock 396
Middle bank 108, 321, 345
Middle bay 415
Middle island 407, 420, 425, 430
Middle shoal 412
Minass Geraes 193
Minhoto reef 130
Mintay rock 412
Miriquiqui bay 102
Missiones province 324
Mocomoco point 6
Mocuripe point 124
Mocuripe point, light 125
Mocuripe serra 123
Moela islet, light 241
Moffit bay 410
Mogotes point, light 333
Moita das Oncas hill 170
Moleque islets 254
Moleque point 142
Molesono river 29
Molino reef 368
Moltke harbor 436
Moltke harbor, anchorage 437
Moltke harbor, currents, tides 437
Moltke harbor, directions 437
Monarch rock 279
Monitz colony 193
Monjui bank 76
Monjui channel 77
Monjui channel, directions 86
Mon Repos estate 26
Monsarras village 77
Mont. (*See* proper name.)
Mont Alegre island 91
Mont Alegre lake 91
Mont Alegre village 91
Montague bank 210
Montague island 437
Monte do Trigo 241

Page.

Montevideo 285

Montevideo, anchorage 287

Montevideo bay, harbor 284

Montevideo, coal 287

Montevideo, communication 286

Montevideo, docks 286

Montevideo, El Cerro 285

Montevideo, islets, rocks 285

Montevideo, lights 287

Montevideo, storm signals 284

Montevideo, supplies 286

Montevideo, tides 288

Montevideo to Buenos Aires 311

Montevideo, wrecks 285

Mont Serrat fort 176

Mont Serrat point 176

Monument, the 136

Mora creek 7

Moreno islet 365

Moreno mount 213

Morona rio 94

Morona rocks 92

Morro Alegre 107

Morro Aracaji 108

Morro Camborello 254

Morro Camocim 121

Morro Camocim, shoal off 121

Morro Curral Grande 123

Morro Enciada 251

Morro Itacolomi 107

Morro Itamirim 249

Morro Marambaia 235

Morro Marumby 249

Morro Matriz Velha 190

Morro Melancia 123

Morro Nossa Senhora da Penha 213

Morro Pernambuco 190

Morro Ribeirão 259

Morro road 126

Morro San Ignacio 277

Morro São Paulo 182

Morro São Paulo, anchorage 183

Morro São Paulo, light 183

Morro São Paulo, tides 183

Morro Telha 171

Morro Velha Pobre 90

Moruka river 13

Moruka shell beach 13

Moscas islet 217

Mossoro rio 129

Mostardas 261

Mostyn rock 279

Mot creek 37

Mot creek, caution 37

Motley islet 408

Page.

Motuoca bay, island 104

Mount. (*See* proper name.)

Mount, the 285

Mucangue Pequena island 228

Mucury river 212

Mudwell 306

Muffins point 170

Mugiquiçaba rio 194

Muitaco 11

Muleques, los 291

Muña, village 97

Mundahú rio 168

Muricipat bank 105

Murihu village 141

Murray heights 399

Murrell river 399

Muruim river 193

Murumuru island 88

Musqueiro point 80

Muta point 185, 197

Mutum-coara island 89

N.

Nanay river 98

Napo rio 95

Naposta river 338

Nassau settlement 31

•Natal 141

Natal, directions 142

Natal, supplies 141

Naufragados light 256

Naufragados point 256

Nauta 98

Navaro hill 269, 277

Navois islet 73

Navy point 399

Nazareth village 74, 159

Needle hill 213

Needle rocks 422

Negra point 91, 142, 225

Negra punta 281

Negro rio 94, 118, 348

Negro rio, anchorage 351

Negro rio, bar 349

Negro rio, bar signals 350

Negro rio, directions 351

Negro rio, light 351

Negro rio, pilots 350

Negro rio, supplies 349

Negro rio, tides 351

Nelson bank 269

Nelson island 438

Nembucu town 390

New Amsterdam 27

New island 428

Page.
New island, tides 429
New island, rock 279
New Rotterdam 30
New Rotterdam, supplies 30
New Year cove 434
Newhaven 416
Nickerie river 29
Nickerie river, beacons 29
Nickerie river, buoys 29
Nickerie river, directions 30
Nickerie river, light 30
Nickerie river, supplies 30
Nictheroy 227
Nine Pin rock 136
Nineteen trees 26
Ninfas point, reefs 358, 359
Nipple hill 355
Nismes 24
Noble peak 438
Norte point 357, 378
Norte point, tide races 357
Norte, rio do 204
North arm 413
North bank 338
North basin 404
North cape 66
North channel 86
North hill 381
North island 428
North Moleques 254
North pass 379
North point 422
North Point island 410
North port 425
Northeast bank 345
Northeast sand 345
Northwest arm 413
Northwest bay 369
Northwest pass 420
Nossa Senhora Candeias 158
Nossa Senhora Desterro 255
Nossa Senhora Graça 249
Nossa Senhora Guadalupe 163, 179
Nossa Senhora Guia 144
Nossa Senhora Judea 198
Nossa Senhora Nazareth 226
Nossa Senhora Oiteiros 160
Nossa Senhora Peña 146, 198
Nossa Senhora Peña point 181
Nossa Senhora Praseres 157
Nossa Senhora Remedios 109, 224
Notre Dame Escalier 192
Nova island 80
Nova islet 73
Novales shoal 370

Page.
Nueva Palmira 322
Nuevo gulf 358
Nuevo gulf, tides 361
Nuevo head 358

O.

Oberon patch 419
Obidos town 92
Obligado 301
Oene bank 15
Oia islet 89
Oiteros de San Miguel 174
Old Settlement cove 421
Oleria pass 89
Olga shoal 238
Olinda channel 158
Olinda point 153
Olinda point, light 154
Olinda reef, buoy 154
Olinda town 153
Olivença village 192
Olivos bay 304
Olivos point 305
Olivos point, light 305
Ollantay-Tambo ruins 96
Onças island 81
Onças Island, tides 83
O'Neil bank 127
Orange cape 50, 64
Orange cape, mud banks 51
Orange cape, tides 51
Orcala 28
Oxford cape 434
Oxford hill 434
Organ mountains 227
Organabo river 39
Orgaos mountains 215
Orinoco river 6
Orinoco river, anchorage 9
Orinoco river, boat landing 9
Orinoco river, climate 10
Orinoco river, current 8
Orinoco river, directions 9
Orinoco river, distance table 11
Orinoco river, height of river 8
Orinoco river, light vessel 8
Orinoco river, navigability 7
Orinoco river, pilots 8
Orinoco river, shoals 7
Orinoco river, tides 9
Orinoco river, water 10
Ortiz bank 289, 308
Os Irmãos point 124
Os Tres Irmãos hills 173
Ostras islets 222

Page.
Ostras rio 222
Ouro-Preto city 170
Outeirinhos, nort hand south, bluffs 243
Ovaringa islet 251
Oven inlet 366
Ovos banks 108
Ovos islet 106
Owen road 413
Oyapok river 49
Oyapok river, anchorage 50
Oyapok river, directions 50

P.

Pabon isle 378
Pacas island 74
Pacata village 199
Pacatuba serra 171
Pachitea river 95
Pacotes rocks 215
Pacoti river 127
Pacoval channel 92
Pacoval island 92
Pai island 230
Paijucara village 167
Palcazu river 95
Palermo 304
Palmar point 269
Palmas bay 237
Palmas bay, anchorage 239
Palmas bay, directions 239
Palmas bay, supplies 239
Palmas flats 300
Palmas island 231
Palmas islet 237
Palmas islets 246
Palmers land 440
Paloma harbor 274
Paloma islets 274
Paloma road 274
Palo Sola 7
Pampas village 296
Pamperos 317
Panacuera light 87
Panapana pass 7
Panato point 38
Panca bank 140
Pan de Azucar 277
Pan de Azucar island 368
Pandorwalet 282
Panela reef 288
Panela reef, lightvessel 288
Panella bank 177
Panella bank, buoys 177
Panema rock 246

Page.
Pao Amarello bar 153
Pao de Açucar 215, 227
Pao Pino islet 238
Papagaio islet 119, 220
Papagaio spit 119
Papagaios islet 233
Papagaios islets 258
Paradise 25
Pará river 75
Pará river, anchorages 82
Pará river, banks 75
Pará river, buoys 75
Pará river, caution 75
Pará river, channels 80
Pará river, climate 53
Pará river, directions for entering 83
Pará river, directions for leaving 85
Pará river, directions for proceeding eastward 86
Pará river, eastern shore 78
Pará river, foul ground 75
Pará river, lights 75, 76, 82, 87
Pará river, pilots 75
Pará river, tides 83
Pará river, western shore 77
Pará river, winds 83
Pará city 81
Pará city, anchorages 82
Pará city, channel to 80
Pará city, coal 82
Pará city, communication 82
Pará city, gridiron 82
Pará city, lights 82
Pará city, pilotage 82
Pará city, port charges 82
Pará city, supplies 81
Pará city, telegraph 82
Pará Guassu rio 181
Paracoara island 90
Paraguay 328
Paraguay, climate 329
Paraguay, general remarks 328
Paraguay, productions 328
Paraguay, river 329
Paraguay river, communication 330
Paraguay river, currents 330
Paraguay river, directions 330
Paraguay river, distances 331
Paraguay river, height of river 329
Paraguay river, pilots 330
Parahiba river 144
Parahiba river, directions 145
Parahiba river, light 145
Parahiba river, pier 145
Parahiba river, pilots 145

Page.
Parahiba river, port charges 145
Parahiba river, tides 145
Parahiba town 145
Parahiba town, communication ... 145
Parahiba town, supplies 145
Parahiba do Sul 218
Parahiba do Sul, light 219
Paramaribo 35
Paramaribo, caution 36
Paramaribo, coal 36
Paramaribo, communication 36
Paramaribo, directions 34
Paramaribo, hospital 36
Paramaribo, quarantine station... 36
Paramaribo, pilots 35
Paramaribo, port charges......... 35
Paramaribo, repairs 36
Paramaribo, signals 36
Paramaribo, supplies 35
Paramaribo, time ball 35
Paramaribo, wharves 35
Parana city 326
Parana city, coal 326
Parana river 324
Parana river, approach 320
Parana river, current 325
Parana river, height of river...... 324
Parana river, distances 331
Parana river, directions 327
Parana Guazu 322
Parana de las Palmas 328
Paranagua bay 246
Paranagua bay, anchorage 247
Paranagua bay, banks, buoys..... 246
Paranagua bay, caution 248
Paranagua bay, channels 246
Paranagua bay, coal 247
Paranagua bay, directions........ 248
Paranagua bay, islets............. 246
Paranagua bay. lights 247
Paranagua bay, pilots 248
Paranagua bay, port charges 247
Paranagua bay, supplies.......... 248
Paranagua bay, shoals............ 247
Paranagua bay, tides 248
Paranagua bank 246
Paranagua town 247
Paranahiba river 120
Paranahiba river, anchorage...... 119
Paranahiba river, light 120
Paranahiba town.................. 120
Parasol bank...................... 39
Parati peak 239
Parati tides 238
Parazinha point 124

Page.
Parcel das Abrolhos 207
Parcel das Paredes 205
Pardo river 193
Pareda point 321
Paredon islet...................... 241
Pargos islet 223
Paria, gulf of 12
Pariacabo mount 43
Paricatuba island.................. 91
Parintins island 92
Parker rock 279
Parmari........................... 98
Parrot cliff........................ 337
Parrot island...................... 29
Pascoal mount 201
Passage bay 366
Passage islands 426
Passo rivulet 162
Pastaza rio 94
Patachos reef...................... 202
Patagones town 352
Patagonia, barometer............. 385
Patagonia, climate................ 353
Patagonia, coast.................. 353
Patagonia, currents............... 385
Patagonia, fogs................... 385
Patagonia, squalls 385
Patagonia, tidal races 386
Patagonia, tidal streams 354, 386
Patagonia, winds, weather........ 383
Patos lake 267
Patos point........................ 123
Patype rio......................... 193
Paulista, praia do 220
Paulo Affonço rapids.............. 170
Páus river......................... 166
Pavon isle......................... 378
Payon bay 289
Payon river 289
Paysandu rio...................... 95
Paysandu town 323
Paytuna serra 91
Paz bank 311
Paz islet.......................... 251
Paz la, town...................... 327
Pea point 434
Peak bay.......................... 134
Peak, the......................... 134
Peat islet......................... 397
Péba point 170
Pebble sound..................... 420
Pebble sound, tides.............. 420
Pecados Mortaes point............ 220
Pedernales river.................. 12
Pedra Branca 236

Page.
Pedra Condé rock 164
Pedra Galçs islet 254
Pedra Grande point 191
Pedra point 250
Pedra Porto rocks 164
Pedra Sal point, light 120
Pedra Secca shoal 132
Pedra Secca light 145
Pedras de Caramuans 182
Pedras island 252
Pedras point 148, 235
Pedras porto 166
Pedras Pretas point 159
Pedreira point 186
Pedrera point 74
Pedrinas, praia das 220
Pedro Lopez point 282
Peixada bank 108
Pelé mount 143
Pelotas, town 268
Pembroke cape, light 398
Penacova chapel, rock 81
Peñedo 171
Peñedo, anchorage 171
Peñedo, bar 171
Peñedo, pilots 171
Peñedo, tugs 170
Peñedo de San Pedro, rocks 133
Peñedo de San Pedro, current 133
Penguin cove 434
Penguin island 375
Penguin point 438
Penguin rock 369
Pequeno ilheo 191
Perdido bay, praia 223
Perez point 284
Pereyra rio 289
Perguiças reef 119
Perguiças river 119
Pericuara rio 124
Periquitos point 67
Pernagoa lake 120
Pernaibão river 120
Pernambuco (Recife) 154
Pernambuco, anchorage, directions 157
Pernambuco, buoys 155
Pernambuco, caution 157
Pernambuco, charges 155
Pernambuco, communication 154
Pernambuco, harbor 155
Pernambuco, lights 154, 156
Pernambuco, morro 190
Pernambuco, pilots 155
Pernambuco, point 191
Pernambuco, population 154
Page.
Pernambuco, reef 154
Pernambuco, semaphore 156
Pernambuco, supplies, coal 156
Pernambuco, tides 157
Pernambuco, the well 154
Pernate 97
Pero point 223
Pero Cão point 215
Peroba point 250
Perohipe river 206
Perroquets isle 50
Persinunga rio 165
Pescadores bank 291
Pesqueiro Fundo point 258
Pesqueiro islands 90
Pesquero island 12
Petimbu point 147
Petimbu port 147
Petropolis 227
Pevas 97
Phillimore island 407
Philomel port 427
Philomel road 426
Piauhy province 120
Picao fort 153
Picao passage 155
Pichis river 95
Pickthorn point 425
Pico serra 215
Piedade 158, 227
Piedade convent 158
Piedras bank, trees 296
Piedras point 275, 296
Piedras Negras punta 282
Pilar point 149
Pilar village 150
Pilcomayo 329
Pilot bank 211
Pina point 158
Pineda paps 370
Pinheira rock 238
Pinheiro point and rock 80
Pipa point, pilots 337
Pipa point, village 142, 337
Pipas rocks 282, 290
Piraboca rock and light 174
Piracumbaua bay, island 100
Pirajuba point 107
Pirangi rio 142
Pirapáma rio 159
Pirarema point 107
Piraussu mount 102
Pirucaua island and bay 104
Pirucaua mount 104
Piruibe creek 244

Page.
Pitanga river 200
Pitiassu´ reefs 200
Pititinga channel 140
Pititinga point 140
Pitt island 441
Piuma 217
Piuma, islet 217
Plata, la bank 305
Platt point 395
Plaia de Santa Rosa 282
Plaia Ramires 284
Pleasant harbor 405
Pleasant harbor, bars 405
Pleasant habor, directions 405
Pleasant isle 405
Pleasant point 405
Pleasant port 405
Pleasant port, tides 406
Pleasant road 406
Poco anchorage 149
Poco, or well 154
Poco village 193
Point. (*See* proper name.)
Poke point 419
Polonio cape, light 272
Polonio cape, anchorage 273
Polonio cape, caution 272
Polonio cape, rock and bay 273
Polonio cape, shoal off 272
Pombas isle 77, 79, 215
Pomerun flats 13
Pomerun point 13
Pomerun river 13
Pomona island 437
Pool, the, Surinam river 33
Pongo de Aguirre, rapid 97
Ponta da Pipa, village 142
Pontal praia 223
Pontinha village 199
Poppa Verde shoal 206
Porcos island 74, 225
Porpoise island, point 412
Port. (*See* proper name.)
Port Egmont cays 420
Porto Alegre 268
Porto Alegre, anchorage 268
Porto Alegre, lights 268
Porto Bello bay 253
Porto Bello bay, supplies 253
Porto Bello point 253
Porto Calvo, rio 166
Porto da Junte 193
Porto de Galinhas 161
Porto de Pedras 166
Porto Frio 224

Page.
Porto Pedro 247
Porto Seguro 193, 198
Porto Seguro, anchorage 199
Porto Seguro, barreiras 198
Porto Seguro, directions 198, 199
Porto Seguro, reefs 198
Portugal point 368
Possession bay 435
Post Leiden 36
Post Orange 37
Potosie bank 30
Potrero bay 281
Poty river 120
Povaoção village 129
Poxim rio 193
Pozo, el 303
Pozo channel 77
Pozuzu river 95
Prado 203
Prado, directions 204
Prado reefs 204
Pragonas banks 186
Praia (or beach) 176, 244
Praia Estreito 261
Praia Ferradura 223
Praia Forno 225
Praia Foro 256
Praia Furado 220
Praia Grande island 100
Praia Iriry 220
Praia Mangues Verdes 118
Praia Paulista 220
Praia Pedrinas 220
Praia Pernambuco 261
Praia Torres 260
Praia Zimbo 190
Prainha village 90
Prancha beach 173
Prata serra 249
Prea river 117
Preto river 212
Pria bay 104
Pria island 104
Priatinga bay 103
Pria-unga bay 103
Promontory point 411
Publications H. O., List of 485
Puerto de Napo 95
Puerto Ingles 282
Puerto Prado river 96
Punahu river 138
Punga bay, islets 103
Puno shoal 283
Punta del Este 275
Punta del Este, bank 279

Page.
Punta del Este, light 275
Purus rio 95
Putumayo rio 94
Pyramid point 408
Pyramid point, cove 409
Pyramid road 360

Q.

Quadra point 153
Quanàre point 11
Quaxinim river 138
Quebra Cabaço cape 257
Queen Charlotte bay 426
Queen Charlotte bay, directions 427
Queimada Grande 244
Queimada islets 244
Queimada Pequeno 244
Quiepé isle 186
Quilmes point 300
Quintano islets 370
Quixada trees 141

R.

Rabbit island 428
Race point 416
Race rocks 422
Ramalho point 152
Ramires beach 284
Ramo, punta del 190
Rapa bank 153
Rapa point 254
Rapa rocks 190
Rasa island 104
Rasa islet 78, 223, 365
Rasa point 332
Raso cape, cove 363
Raso cape, anchorage 363
Rat island 134, 229, 285
Raton Grande islet 257
Raton Pequeno islet 257
Raton river 257
Ratos islet 78
Raybois point 43
Raymondo point 107
Raza da Cotinga island 246
Raza island 231
Raza island, light 231
Raza islet 215, 273
Raza point 281, 346
Ready shoal 276
Real, plank of 173
Real rio 173
Real rio, light 173
Recife 154

Page.
Recoleta church 303
Redonda island 104, 226, 231
Redonda islet 207
Redonda point 348
Redonda point, village 129
Red point 273
Reef, the 139
Reef channel 421
Reef channel island 409
Reef point 421
Reis Magos river 212
Remedios isle 73
Remedios islets 252
Remire islets 47
Remire islets, caution 40
Reparo bank 355
Resolutie plantation 32
Resolutie shallows 32
Resolution shoal 103
Restinga de Marambaia 235
Restinga island 235
Retiro bay, bank 129
Retiro Grande point 129
Retiro point 218, 304
Riachuelo 302
Ric à Rac plantation 35
Richards port 427
Rincon, el 335
Rincon, directions 336
Rincon de Alcibar 289
Rio de Janeiro 227
Rio de Janeiro, anchorage 230
Rio de Janeiro, climate 53
Rio de Janeiro, coal, docks 228
Rio de Janeiro, directions 232
Rio de Janeiro, forts 229
Rio de Janeiro, islets in harbor 229
Rio de Janeiro, islets off harbor 230
Rio de Janeiro, landing 227
Rio de Janeiro, landmarks 232
Rio de Janeiro, lights 231
Rio de Janeiro, port charges 229
Rio de Janeiro, population 227
Rio de Janeiro, quarantine 229
Rio de Janeiro, railroads 227
Rio de Janeiro, route to the northward 234
Rio de Janeiro, supplies 228
Rio de Janeiro, tides, winds, weather 231
Rio de Janeiro, time signal 227
Rio de la Plata 270
Pio de la Plata, approaches to 305
Rio de la Plata, aspect 270
Rio de la Plata, barometer 319
Rio de la Plata, caution 310

Page.
Rio de la Plata, currents, tides 313
Rio de la Plata, fog 319
Rio de la Plata, directions 309
Rio de la Plata, ground log 315
Rio de la Plata, lightning 319
Rio de la Plata, lightvessels 307, 309
Rio de la Plata, pamperos 317
Rio de la Plata, rain 319
Rio de la Plata, refraction 320
Rio de la Plata, thermometer 319
Rio de la Plata, south coast 294
Rio de la Plata, pilots 271
Rio de la Plata, winds, weather 315, 318
Rio, River. (*See* proper name).
Rio Grande do Norte 141
Rio Grande do Norte, bar 141
Rio Grande do Norte, directions 142
Rio Grande do Norte, light 141
Rio Grande do Sul 262
Rio Grande do Sul, anchorages 264
Rio Grande do Sul, banks off 269
Rio Grande do Sul, bar 262
Rio Grande do Sul, buoys 263
Rio Grande do Sul, channel 263
Rio Grande do Sul, climate 268
Rio Grande do Sul, coal 262
Rio Grande do Sul, coast 262
Rio Grande do Sul, communication 262
Rio Grande do Sul, directions 265
Rio Grande do Sul, light 263
Rio Grande do Sul, pilots 264
Rio Grande do Sul, signals 263
Rio Grande do Sul, tides 265
Rio Grande do Sul, towns 262
Rio Grande do Sul, winds, currents 261
Rios bay 238
Rios village 238
Risca das Bicudas reef 132
River, Rio. (*See* proper name).
Rivers peak 372
Roberts island 438
Robledo islets 369
Rocas reef 135
Rocas reef, anchorage 136
Rocas reef, currents and tides 136
Rocas reef, landing 135
Rocas reef, light 135
Röcha lagoon 274
Röcha, punta da 273
Roches Plattes 42
Rodeo anchorage, trees 296
Rodgers bank 209
Rodney cove 431
Rosado village 129
Rosario 7

Page.
Rosario pass 7
Rosario point 290
Rosario town, coal 326
Rosario town, anchorage 326
Rosario town, communication 326
Rosas bay 354
Rosas mount 296
Rouen bank 308
Round island 397, 426
Rous creek 426
Roy cove 425
Royal bay 436
Royal bay, anchorage 436
Royale islet 41
Royale islet light 41
Rubia head 345
Rubia point 273, 346
Ruby patch 276
Ruggles bay 416

S.

Sabaneta point 6
Sacco de Peroba 251
Sacco do Gargau bay 218
Saddle hill 161
Saddle island 428, 438
Saguasu river 249
Sahi river 212
Sail rock 426
Salut isles 41
Salut isles anchorage 41
Salut isles, caution 40, 42
Salut isles, climate 41
Salut isles, directions 42
Salut isles, lights 41
Salut isles, semaphore 42
Salut isles, supplies, coal 42
Salut isles, tides 42
St. Agostinho, cape, light 159
St. Andrew point 27
St. Antonio peninsula 366
St. Antonio point 367
St. Elena 364
St. Francois rock 44
St. George gulf 365
St. George settlement 50
St. Gonsalo church 151
St. João battery 214
St. Jorge dos Ilheos 190
St. Jorge dos Ilheos, anchorage 191
St. Jorge dos Ilheos, directions 191
St. Jorge dos Ilheos, tides 191
St. Joseph islet, light 41
St. Paul rocks 133
St. Paul rocks, caution 133

Page.
St. Paul rocks, winds, current 133
St. Roque bay, point 366
St. Roque cape 138
St. Roque cape, caution 138
St. Roque cape, currents, tides 139
St. Roque cape, winds 139
St. Roque, channel 140
St. Roque channel, directions 140
St. Roque reefs 139
St. Sebastião point 225
St Thomé bank, light 219
St. Thomé cape 219
St. Thomé cape, soundings 220
Salaberria reef 363
Salado river 296
Salado river, tides 296
Salamancha peak 370
Salgado rio 166
Salinas bay and village 101
Salinas bay, anchorage 101
Salinas bay, tides 102
Salinas, false, bay 102
Salinas, lights, pilots 101
Salinas rio 194
Salsa rio 193
Salto 323
Salto de Aguerre rapid 97
Salto d'Apipe 324
Salto de Guayro 331
Salto Grande 323
Salvação beach 159
Salvador Grande cerro 296
Salvador port 395
Salvador port, caution 395
Salvador port, directions 396
Salvador port, tides 396
Samôco point, light 171
San Amaro island 180
San Amaro mount 180
San Antonio 93
San Antonio bay 79, 135
San Antonio bank 174
San Antonio bank, buoys 174
San Antonio cape 295, 322
San Antonio cape, tides 295
San Antonio point 174, 194
San Antonio point, light 174
San Antonio point, winds 174
San Antonio port 355
San Antonio port, banks 355
San Antonio port, caution 356
San Antonio port, directions 355
San Antonio port, outer anchorage 356
San Antonio port, supplies 355
San Antonio port, tides 355

Page.
San Antonio river 79
San Antonio sierras 356
San Antonio village 255
San Bento convent 152
San Blas, anchorage 347
San Blas, banks 345
San Blas, beacons, buoys 345
San Blas, channels 346
San Blas, climate 345
San Blas, directions 346
San Blas, harbor 345
San Blas, settlement 345
San Blas, supplies 347
San Blas, tides 347
San Boronbon bay 295
San Boronbon river 296
San Carlos port 415
San Carlos river 416
San Carlos town 278
San Carmen town 352
San Carmen, communication 352
San Carmen, supplies 352
San Christovao 173
San Felipe de Montevideo 285
San Fernando dock 302
San Francisco do Norte 170
San Francisco do Norte light 171
San Francisco convent 161
San Francisco point 109
San Francisco river 109, 197
San Gabriel island 290
San Gaëtano river 78
San Gonçalo rio 124
San Gonçalo anchorage, village 124
San Gregorio point, river 289
San Ignacio morro 277
San João bank 76
San João islands 104
San João islands, anchorage 105
San João islands, banks, caution 104
San João islands, light 105
San João islands, shoal near 102
San João island, tides 105
San João river 220
San João serra 221
San Joaquin point 74
San José anchorage 153
San José bar 152
San José bay 117
San José cape 363
San José church 152
San José de Porto Alegre 212
San José Ignacio lagoon 275
San José Ignacio point 275
San José Ignacio point, light 275

Page.
San José point 164, 284
San José port 356
San José port, anchorage 357
San José port, tidal races 357
San José village 164
San Juan cerros 320
San Juan passes 328
San Juan river 321
San Julian port 377
San Julian port, directions, tides 377
San Julian port, supplies 377
San Lorenzo river 329
San Luiz (Maranhão) 110
San Luiz harbor 109
San Luiz harbor, directions 112, 114
San Marcello do Mar, fort 176
San Marcos bank 109
San Marcos bay 108
San Marcos light 111
San Mateo river 212
San Mateo town 212
San Matias gulf, bank 354
San Matias gulf, tidal races 354
San Miguel rio 169, 289
San Miguel rio, anchorage 169
San Miguel village 143, 255
San Nicholas town 325
San Pasqual reef 368
San Pedro do Sul town 262
San Pedro, ombu tree 320
San Pedro river 320
San Regis 98
San Rogue mission 98
San Salvador (Bahia) 176
San Salvador island 89
Sandbar island 419
Sand hills (Essequibo) 18
Sandy Bay island 409
Sandy point 127, 289
Sandwich group 437
Santarem, town 91
Santa Anna anchorage 117, 222
Santa Anna banks 321
Santa Anna bay 117, 222
Santa Anna island 117
Santa Anna island, tides 117, 222
Santa Anna islets 222
Santa Anna light 117
Santa Anna reefs 117
Santa Anna river 191
Santa Anna town 169
Santa Anna village 238
Santa Barbara islet 206
Santa Barbara islet, light 207
Santa Catharina island 254

Page.
Santa Catharina island, anchorages 255
Santa Catharina island, climate 54
Santa Catharina island, directions 257
Santa Catharina island, lights 256
Santa Catharina island, north channel 256
Santa Catharina island, south channel 257
Santa Catharina island, supplies 255
Santa Catharina island, tides, winds 256
Santa Cruz 98
Santa Cruz bay 195, 364
Santa Cruz bay, anchorage 196
Santa Cruz bay, directions 196
Santa Cruz bay, light 231, 378
Santa Cruz bay, tides 196
Santa Cruz river 197, 212, 378
Santa Cruz river, anchorage 380
Santa Cruz river, bar 379
Santa Cruz river, beacons 379
Santa Cruz river, directions 380
Santa Cruz river, northern arm 378
Santa Cruz river, western arm 379
Santa Cruz river, village 197, 235, 379
Santa Cruz river, tides 380
Santa Cruz river, supplies 379
Santa Elena port 364
Santa Elena port, anchorage, tides 364
Santa Elena port, supplies 364
Santa Fé 326
Santa Isabel 94
Santa Lucia river and bank 289
Santa Luzia hill 214
Santa Luzia hill, light 214
Santa Luzia point 213
Santa Maria cape 273
Santa Maria cape, light 273
Santa Maria cape, rock off 274
Santa Maria point 289
Santa Maria river 213
Santa Maria river, bar 214
Santa Marta Grande cape 260
Santa Marta Grande light 260
Santa Rita island 169
Santa Rosa bank 76
Santa Rosa bay, beach 282
Santa Teresa fort 269
Santiago bank 299
Santiago, directions 299
Santiago, harbor works 298
Santiago island 297
Santiago point 297
Santiago, tides 300
Santo Alberto channel 131

Page.
Santo Alberto channel, tides 131
Santo Alberto point 131
Santo Aleixo island 162
Santo Aleixo island, anchorage 162
Santo Aleixo island, tides 162
Santo Antonio Grande river 167
Santo Antonio town 154
Santo Antoniomirim river 166
Santo Paulo 97
Santos 242
Santos, anchorage 242
Santos, bay 241
Santos, buoys 242
Santos, charges 243
Santos, directions 243
Santos, harbor 241
Santos, pilots 243
Santos, light 242
Santos, supplies, coal 243
Santos, tides 243
Santos Reis Magos fort 141
Santos Reis Magos fort, light 141
São Amaro island 241
São Bento point and church 165
São Francisco do Sul rio 249
São Francisco do Sul rio, anchorage 250
São Francisco do Sul rio, beacons, buoys, caution 250
São Francisco do Sul rio, directions 251
São Francisco do Sul rio, light 249
São Francisco do Sul rio, outer anchorage 251
São Francisco do Sul rio, pilots 252
São Francisco do Sul rio, shoals 250
São Francisco do Sul rio, tides 250
São Francisco do Sul rio, winds 250
São Francisco island 249
São Francisco town 249
São Gonzalo da Paiva village 158
São João da Barra 218
São João town 218
São José de Norte town 263
São Paulo morro 182
São Paulo morro, anchorage 183
São Paulo morro, light, tides, directions 183
São Pedro do Sul town 262
São Pedro islets 254
São Sebastião channel 240
São Sebastião island 240
São Sebastião, supplies 241
São Sebastião, telegraph 240
São Sebastião, tides 241
São Sebastião, town 240
Sapetiba bay and point 235

Page.
Sapetiba bay, anchorage, tides 236
Sapetiba bay, directions 236
Sapetiba point 235
Sapucaiaroca 98
Sara bank 283
Saramacca river 30
Saramacca river, caution 31
Saramacca river, tides 31
Sarandi punta 284
Sarangonha point, light 268
Sarayacu village 95
Sarina rock 285
Sarmiento bank 383
Saturday point 411
Saucé point, light 290
Saucé rivulet 290
Saunders island 421, 437
Savoie rocks 235
Sea Bear bay 375
Sea Bear bay, directions 375
Sea Bear bay, supplies 375
Sea Bear bay, tides 376
Sea Dog islet 431
Sea Lion island 380
Sea Lion islands 411
Sea Lion rock 369
Sea Lion rocks 397
Seal cove 409
Seal island 372, 409
Seal point 402, 409
Seal rocks 398, 428
Sealers cove 421
Seba 19
Sebastião Gomez reef 206
Sebastião point 241
Secca Coroa 78
Secca river 213
Second Barranca 346
Second island 29
Sedge island 421
Sellada serra 161
Selleiro mount and point 149
Sena point 235
Sergipe rio 173, 181
Serigi river 181
Serinhaem town, rio 161
Serpa island, town 92
Serpent bank 343
Serpents island 229
Serpents mouth 11
Serra. (*See* proper name.)
Serra Grande and point 189
Serramby point 161
Serrat mount 243
Severs palms 40

Page.
Shag harbor 417
Shag harbor, anchorage 417
Shag rock 376, 409
Shag rocks, South Atlantic 435
Shallow harbor 426
Shallow harbor, tides 428
Shallow point 427
Shell point 411
Shere reef 189
Shingle point, beacon 373, 379
Ship channel 17
Ship harbor 428
Ship harbor, tides 428
Ship isle 365
Shirreff, cape 442
Shoal bluff 360
Sholl point 378
Sibaluma hill, river 143
Sierra. (*See* proper name.)
Silla Chica hill 277
Silla Grande hill 277
Simão Pinto point 158
Sinnamari, telegraph 40
Sinnamari river 40
Sinnamari river, directions 40
Sioba reef 140
Sioba rock 186
Siriba islet 207
Sirius shoal 376
Sisters, the 410
Sita de Piza village 91
Sitio Forte bay 238
Sitio Forte bay, supplies 238
Siton do Torou point 91
Skeldon plantation 29
Smack point 127
Small islet 428
Seal farm 333
Smith island 440
Smylie channel 430
Snake bank 345
Snow islet 438
Snug cove 413
Sociedad estancia 334
Society farm 334
Soden Savannah 35
Sola island 365
Soledad 10
Solis rock 282
Solis Chico rivulet 282
Sommelsdyk settlement 32
Sororoca reef 191, 198
Sororo Cussu reef 185
Sorrell ledge 372
South Atlantic, icebergs 387

Page.
South Barranca hill 348
South cape 366
South Georgia island 435
South Georgia island, islets of 436
South Georgia, anchorage 436
South harbor 428, 430
South harbor, settlement 428
South island 207
South Moleques 255
South Orkneys 437
South point 349
South Shetland islands 438
South Shetland islands, directions 442
South Shetland islands, tides 441
South Shetland islands, winds 442
Southeast channel 206
Southeast channel, directions 206
Southern Thule island 437
Southwest isle 365
Sparonine 39
Sparrow cove 398
Sparrow cove, anchorage 399
Speedwell island 414
Spiring bay 376
Split island 425
Spring Garden estate 16
Squib point 408
Staats island 430
Stag road 397
Stanley harbor 399
Stanley harbor, anchorage 399
Stanley harbor, caution 402
Stanley harbor, communication 399
Stanley harbor, directions 400-401
Stanley harbor, pilots 398
Stanley harbor, tides 400
Stanley harbor, supplies, coal 399
Starve island 344
Steeple Jason 424
Stephens bluff 432
Stephens bluff, island 432
Stephens port 431
Shephens port, anchorage 432
Stephens port, communication 432
Stephens port, directions, tides 432
Stop cove 431
Stork shoal 276
Suàpe rio 160
Suàpe rio, bar 160
Sugar bank 17
Sugarloaf island 438
Sugarloaf peak 136, 214, 227
Sul, bay do 79
Sul de la, cerros 95
Sul rio 204

Page.
Sullivan harbor 411
Sulphur bank 289
Sumacas islands 104
Sunk rock 416
Sur, cabo del 366
Surinam river 32
Surinam river, anchorage 33
Surinam river, buoys 33
Surinam river, caution 32, 36
Surinan river, directions 34
Surinam river, lights 33
Surinam river, pilots 33
Surinam river, rollers 33
Surinam river, tides 33
Surinam river, upper river 35
Sussex port 416
Swallow islet 218
Swan inlet 407
Swan islands, passage 419
Swan point 426
Sylvia bank 210, 279
Symonds harbor 427

T.

Tabatinga point 142
Tabitinga town 95
Tabatinga village 142
Table island 443
Tacami islet 259
Tacuatiba islet 238
Tacuruzà island 236
Tagus rock 285
Tahua reef 202
Tainhas channel 206
Taipu point 78
Taïpu point, land near 78
Taipus hills 185
Tala clump 296
Tamandaré port, anchorage 163
Tamandaré port, bay 163
Tamandaré port, directions 164
Tamandaré port, water 164
Tamandua point 104
Tamandua point, caution 104
Tamar harbor, pass 420
Tamar harbor, tides 420
Tamba red cliff 143
Tambahu anchorage 146
Tambo rio 96
Tamboretes islets 252
Tandil sierra, river 333
Tanheiras rocks 79
Tapaca 80
Tapado rio 153
Tapage point 123

Page.
Tapajos river 91
Tapará river 91
Tapitinga islets 252
Tapuiu river 121
Tarano point 213
Tas de Roches 447
Tatinga point 107
Tatuoca islet 80
Tatuoca rio 160
Taveira river 160
Tawari serra 91
Taypu point 241
Tea channel and island 430
Teal creek 408
Teffé 97
Tejucupapo lake 148
Tejucupapo rio 150
Tejuipe village 189
Telzereo island 6
Terra d'Algodão 188
Texeira island 247
Theresa Panca bank 140
Three Brothers shoal 108
Three Crowns hill 434
Three Points cape 371
Tiaia serra 121
Tickle pass 419
Tide creek 354
Tide islet 426
Tide rock 416
Tiger banks 38
Tiger island 15
Tiger islet 289
Tiger river 289, 305
Tigers hole 32
Tijoca bank 76
Tijoca bank, buoy 76
Tijoca point 77
Tijucas bay 253
Tijucas isles 234
Tilli road 370
Timbobas reefs 204
Timonha river 121
Tinharé island 182
Tobacco point 134
Tocantins rio 88
Tocansa island 105
Toledo plantation 35
Tomba-as Aguas river 151
Tombo point 362
Tonnégrande river 46
Topari point 78
Torépé falls 49
Toro banks 338
Torres 260

Page.
Torres beach 260
Torres islets 273
Toulonaise rocks 40
Tourlouri channel 65
Touro point, village 130
Tova island 368
Tova island, note 369
Tovva island, supplies 368
Tower rock 374
Town point 426
Tracunhaem river 148
Trahiry river 142
Traição bay 143
Traição point 143
Tramandahy river 260
Trancoso rio 200
Trapixe river 161
Treason bay 143
Tree islet 238
Trelew village 359
Tres Cerros hill 277
Tres Puntas, cape 371
Tres Irmãos point 130
Tres Irmãos rocks 255
Trincheiras bay 191
Trinidad island 136
Trinidad island, pilots 12
Trinidad point 239
Trinidade island 92
Trinity land 440
Trinxheira point 242
Triste islands 409
Triste mount 363
Triton bank 269
Triton shoal 285
Trois Ermites peak 50
Tromba Grande cape 188
Trombina river, point 188
Trumahi bay 104
Tubao hill 129
Tubarão 259
Tubarão point 132, 213
Tubarão river 130
Tucunanduba island and bay 106
Tufted hill 297
Tumuc Humac mountains 1
Tuna islet 274
Tupiassu island 184
Turn island 409
Turn point 406
Turtle bank 30
Turtle rock 155, 162
Turyassu bay 105
Tury point 106

Page.
Turyrana bay 106
Tussac island 404
Tussac point 399
Tutoia reef 119
Tutoia river, anchorage 119
Tutoia river, shoal off 119
Tutoia river, tides 120
Tuyu bank, river 295
Twins 135
Twins islands 422
Two Sisters peaks 354
Tyssen islands and passage 419
Tyssen kelp patch 418

U.

Uanares river 50
Uassa river 50
Ubatuba 239
Ubatuba bay 239
Ubatuba bay, anchorage 239
Ucayali rio 95
Una Mirim river 192
Unanima bank 210
Una pass 164
Una pass, directions 165
Una river 84, 165, 182, 192, 220, 244
Union bay 343
Union bay, banks 343
Union bay, directions 344
Union bay, tides 344
Union point 362
Urarinas 98
Uranie rock 396
Urca Conceição reef 132
Urca Cotia reef 131
Urca Cotia reef, banks near 131
Urca do Tubarão reef 132
Urca do Tubarão reef, caution 132
Urca Minoto shoal 132
Urca Oliveria reef 132
Urubamba rio 96
Urubucoara serra 90
Uruburetama mountains 124
Uruguay 270
Uruguay, climate 270
Uruguay, productions 270
Uruguay river 322
Uruguay river, approaches 320
Uruguay river, distances in 331
Uruguay river, height of; current 323
Uruguay river, pilots, supplies 324
Urussuhy river 120
Usborne mount 389

Page.

V.

Vacari rio 194
Vacas town 322
Vagre river 12
Val de Caes rock 80
Valdes creek 358
Valdes island 367
Valdes peninsula 356
Valdes peninsula, tide races 357
Valenca town 183
Valois shoal 250
Varzea town 165
Vaú town 165
Vaú Una 165
Vazabarris rio 173
Vazabarris rio, bar 173
Vazabarris rio, directions 173
Velha barra 205
Velha d'Iguaracu river 121
Velha d'Iguaracu river, tides 121
Velha Pobre island 90
Velha reef 124
Velhas island 90
Venado island 12
Venda Grande point and village 158
Ventana sierra 335
Vera bay 363
Verde islet 191
Verde point 167
Vermejo river 329
Vermelha bank, point 196
Vermelha bank, buoy 196
Vermelha beach 229
Vermelha Coroa islet, reef 206
Vermelha point, reef 196
Verte isle 41
Vettor Pisani bank 156
Viado hill 118
Viana isles 369
Viçosa reef 206
Viçosa town 211
Victoria 214
Victoria, anchorage 214
Victoria, bank 210
Victoria, beacons, buoys 214
Victoria, directions 214
Victoria harbor 407
Victoria island 240
Victoria, suburb 176
Victoria, supplies, coal 214
Victoria, tides 214
Video monte 376
Vieira branch, point 90
Vigia channel 78

Page.
Vigia village 78
Villa Bella bay 214
Villa da Fortaleza 125
Villa de Concepcion 331
Villa Franca 331
Villa Nova 217
Villa Nova de Princessa 240
Villa Nova de Princessa, telegraph 240
Villa Pilar 330
Villa Rica 330
Villa Viçosa 211
Villarino point 355
Villegagnon fort 229
Villegagnon light 229
Villeta pass 330
Viper bank 345
Virgins cape 382
Virgins cape, caution 383
Virgins cape, rocks off 383
Visokoi island 437
Vitalo rock 43
Volage bank 252, 379
Volunteer point 396
Von Roon rock 132
Voorburg plantation 32
Vredenburg 37
Vreeden Hoop estate 23
Vriesland estate 24
Vulcan, sierra 333

W.

Waini river 12
Waini shell beach 13
Wakenaam island 14
Wallis isle 436
Warrah stream 420
Warrapa creek 36
Washington strait 438
Watchman cape 377
Water bay 134
Watering point 369
Weddell bluff 378
Weddell island 429
Wells point 375
West arm 411
West cove 407
West island 419
West point 368, 412, 429
West Falkland island 420
West passage 426
West Point island 422
West Point pass 424
West Point passage 347
Western lage 238

Page.

Whale passage 426

Whaler bay 425

Wharton harbor 416

White Horse rock 44

White islet 217, 222

White point 403

White rock 368

White rock bay, point 416

White rocks 285

Wia Wia bank 37

Wickham heights 389

William port 398

William port, beacon 398

William port, directions 400

William port, tides 400

William islets 398

William point 398

Williams rock 438

Winds, North Atlantic 54

Winds, Brazil, east coast 55

Winds, Brazil, north coast of 60

Winds, land and sea breezes 58

Winds, South Atlantic 55

Windsor Forest estate 44

Wiwini lake 65

Wolf island 416

Wolf rock 398

Wood mount 377

Wood shoal 433

Wreck island 421

Page.

X.

Xarays marsh 328

Xavier isle 254

Xerne point 223

Xingu rio 90

Y.

Yavari rio 95

Yavari Mirim 95

Yavarisiñ rio 95

Yaya pass 7

York redoubt 26

Yorke point 398

Yquitos town 98

Ytaya river 98

Yuca vale 96

Yurimaguas town 97

Yurna rio 94

Z.

Zarate 328

Zavodovskii island 437

Zebirgo point 11

Zeelandia island 14

Zimbo praia 190

Zimbos bay 253

Zimbos point 253

Zime bank 210

Zorg beacon 15

Zuraita island 337

LIST OF HYDROGRAPHIC OFFICE PUBLICATIONS, ETC.

No.	Title of book.	Price.
	NORTH ATLANTIC OCEAN.	
22	General Examination of the Atlantic Ocean. By Capt. Charles Philippe De Kerhallet. Translated by Capt. R. H. Wyman, U. S. N. 8vo. 1870. Hydrographic Office	$2.00
	Supplement No. 1. 1886. Hydrographic Office	.10
45	General Directions for the Atlantic Ocean. From the French of F. Labrosse. Second edition. Translated by Lieut. Commander J. B. Coghlan, U.S.N. 8vo. 1873. Hydrographic Office	2.00
99	Nova Scotia, Bay of Fundy, and South Shore of Gulf of St. Lawrence to Miramichi Bay. Compiled by R. H. Orr. 8vo. 1891. Hydrographic Office	1.50
	Supplement. 1894. Hydrographic Office	.10
100	Gulf and River St. Lawrence and Cape Breton Island, including Cape Breton, Magdalen, and Anticosti Islands. Compiled by R. H. Orr. 8vo. 1891. Hydrographic Office	1.50
104	The depths that can be carried into the harbors and anchorages on the Atlantic and Gulf coasts of the United States. Prepared by Gustave Herrle. (Pamphlet.) 1893. Hydrographic Office	.25
86	The Navigation of the Caribbean Sea and the Gulf of Mexico. Vol. I. The West India Islands, including the Bahama Banks and Islands, and the Bermuda Islands. Third edition. Compiled by R. C. Ray, U. S. N. 8vo. 1892. Hydrographic Office	1.50
	Supplement. 1894. Hydrographic Office	.10
64	The Navigation of the Caribbean Sea and the Gulf of Mexico. Vol. II. Coasts from the Rio Grande del Norte to Cape Orange with adjacent islands and dangers. Second edition. Revised by R. C. Ray, U. S. N. 8vo. 1890. Hydrographic Office	1.50
	Supplement. Second edition. 1893. Hydrographic Office	.10
	Supplement No. 2. Gulf coast of the United States. Compiled by Lieut. W. S. Hughes, U. S. N. 8vo. 1891. Hydrographic Office	.40
73	Newfoundland and Labrador. Compiled by Lieut. W. W. Gilpatrick and Ensign John Gibson, U. S. N. 8vo. 1884. Hydrographic Office	1.00
78	Newfoundland and Labrador. Supplement. 8vo. 1886. Compiled by Lieut. R. G. Davenport and Ensign John Gibson, U. S. N. Hydrographic Office	.60
	Supplement No. 2. 1891. Hydrographic Office	.20
70	Sailing Directions for the Kattegat Sound, and the Great and Little Belts to the Baltic Sea. Compiled by Commander William Gibson, U. S. N. 8vo. 1881. Hydrographic Office	.75
	Supplement No. 1. 1886. Hydrographic Office	.10
34	Sailing Directions for the English Channel. Part I. South Coast of England. 8vo. 1872. Hydrographic Office	1.50
	Supplement. Third edition. 1893. Hydrographic Office	.20
35	Sailing Directions for the English Channel. Part II. Compiled by Master Asher C. Baker, U. S. N. 8vo. 1877. Hydrographic Office	2.50
	Supplement. Third edition. 1893. Hydrographic Office	.20
60	Coasts and Ports of the Bay of Biscay. Translated and compiled by Lieuts. G. M. Totten and Seaton Schroeder, U. S. N. 8vo. 1876. Hydrographic Office	2.50
	Supplement. Third edition. 1892. Hydrographic Office	.10
23	Winds, Currents, and Navigation of the Gulf of Cadiz, the Western Coast of the Spanish Peninsula, and the Strait of Gibraltar, by Capt. R. H. Wyman, U. S. N. 8vo. 1870. Hydrographic Office	1.00

No.	Title of book.	Price.
	NORTH ATLANTIC OCEAN—Continued.	
52	Northwest, West, and South Coasts of Spain, and the Coast of Portugal from Point Estaca to Cape Trafalgar. Translated and compiled by Lieut. George M. Totten, U. S. N. 8vo. 1874. Hydrographic Office	$1.50
	Supplement. Second edition. 1890. Hydrographic Office	.10
25	General Examination of the Mediterranean Sea. By Capt. A. Le Gras, I. F. N. Translated by Capt. R. H. Wyman, U. S. N. 8vo. 1870. Hydrographic Office	2.00
37	Mediterranean. Part I. S. and SE. Coasts of Spain from Mala Bahia to Cape Creux. Balearic Islands and N. Coast of Africa from Ceuta to La Cala. Translated and compiled by Lieut. Commander H. H. Gorringe, U. S. N. 8vo. 1875. Hydrographic Office	2.50
	Supplement. Third edition. 1892. Hydrographic Office	.10
38	Mediterranean. Part II. South Coast of France; West Coast of Italy; Tuscan Archipelago; Corsica and Sardinia. By Lieut. Commander H. H. Gorringe, U. S. N., assisted by Lieut. Seaton Schroeder, U. S. N. 8vo. 1878. Hydrographic Office	2.50
	Supplement. Third edition. 1892. Hydrographic Office	.10
42	Mediterranean. Part III. Coast of Tunis; Sardinia; Sicily and Malta Channels; Lipari Islands; Sicily; Strait of Messina; Coast of Tripoli; Coast of Egypt; Syria. By Lieut. Commander H. H. Gorringe, U. S. N., assisted by Lieut. Seaton Schroeder, U. S. N. 8vo. 1879. Hydrographic Office	2.30
	Supplement. Third edition. 1892. Hydrographic Office	.15
68	Mediterranean. Part IV. Gulf of Gioja to Cape Santa Mario di Leuca, South Coast of Italy, the Adriatic Sea, Ionian Islands, the Coasts of Albania and Greece to Cape Malea, with Corigo Island, including the Gulfs of Patras and Corinth. Compiled by Lieut. John M. Hawley, U. S. N. 8vo. 1883. Hydrographic Office	2.30
	Supplement. Third edition. 1892. Hydrographic Office	.15
102	The Azores, Madeiras, Canaries, and Cape Verde Islands. Second edition. Revised by R. C. Ray. 8vo. 1892. Hydrographic Office	.80
105	West Coast of Africa. From Cape Spartel to Cape Agulhas, including the Islands in Bight of Biafra, Ascension, St. Helena, Tristan da Cunha, and Gough Islands. Second edition. Compiled by R. C. Ray, U. S. N. 8vo. 1893. Hydrographic Office	1.50
15	Memoir and the Dangers and Ice in the North Atlantic. (Pamphlet.) 1868. Bureau of Navigation	.20
93	Ice and Ice Movements in North Atlantic Ocean. By Ensign Hugh Rodman, U. S. N. (Pamphlet.) 1890. Hydrographic Office	.20
	SOUTH ATLANTIC OCEAN.	
88	East Coast of South America. From the Orinoco River to Cape Virgins, including Falkland, South Georgia, Sandwich, and South Shetland Islands. Second edition. Compiled by R. C. Ray, U. S. N. 8vo. 1894. Hydrographic Office	......
61	The Rio de la Plata. Translated and compiled by Lieut.-Commander H. H. Gorringe, U. S. N. 8vo. 1875. Hydrographic Office	1.50
	Supplement No. 1. 1886. Hydrographic Office	.10
54	Navigation of the Strait of Magellan. Translated from the French by Commodore J. C. P. de Krafft and Commander William Gibson, U. S. N. (Pamphlet.) 1883. Hydrographic Office	.20
55	Remarks by Capt. M. A. Lefèvre, of the French Navy, on the voyage of the Vaudreuil through Patagonian Channels and Magellan Strait. Translated by Lieut. George M. Totten, U. S. N. (Pamphlet.) 1874. Hydrographic Office	.20
	PACIFIC OCEAN.	
5	General Examination of the Pacific Ocean. By Capt. Charles Philippe De Kerhallet, French Imperial Navy. Translated under the direction of Commodore Charles Henry Davis, U. S. N. 8vo. 1867	1.50
	Supplement No. 1. 1886. Hydrographic Office	.10

No.	Title of book.	Price.
	PACIFIC OCEAN—Continued.	
58	The Navigation of the Pacific Ocean. Translated from the French of Mons. F. Labrosse, by Lieut. J. W. Miller, U. S. N. 8vo. 1874, Hydrographic Office. Republished 1893	$1.50
89	The West Coast of South America, including Magellan Strait, Tierra del Fuego, and the Outlying Islands. Compiled by R. C. Ray, U. S. N. 8vo. 1890. Hydrographic Office	1.20
	Supplement. Third edition. 1893. Hydrographic Office	.20
84	West Coast of Mexico and Central America, from the United States to Panama, including the Gulfs of California and Panama. Second edition. Compiled by R. C. Ray, U. S. N. 8vo. 1893. Hydrographic Office	1.50
96	The Coast of British Columbia. From Juan de Fuca Strait to Portland Canal, including Vancouver and Queen Charlotte Islands. Compiled by R. C. Ray, U. S. N. 8vo. 1891. Hydrographic Office	1.50
	Supplement. Second edition. 1894. Hydrographic Office	.20
41	List of Reported Dangers in the North Pacific Ocean. 8vo. 1871. Hydrographic Office	1.00
	Supplement No. 2. 1891. Hydrographic Office	.15
41^b	Supplement to Reported Dangers in the North Pacific Ocean. Compiled and arranged by Commander William Gibson, U. S. N. 8vo. 1880. Hydrographic Office	1.00
41^a	List of Reported Dangers in the South Pacific Ocean. Compiled and arranged by Lieut. J. E. Pillsbury, U. S. N. 8vo. 1879. Hydrographic Office	1.00
	Supplement. 1891. Hydrographic Office	.15
92	Ice and Ice Movements in Bering Sea and the Arctic Basin. By Ensign E. Simpson, U. S. N. (Pamphlet.) 1890. Hydrographic Office	.20
	INDIAN OCEAN.	
85	Sailing Directions of the Indian Ocean, the winds, monsoons, currents, and passage, including also the Java Sea, Sulu Sea, Afuera Sea, and the Philippine Islands. Compiled by Lieut. F. E. Sawyer, U. S. N. 1887. Hydrographic Office	1.00
	Revised Supplement. 1894. Hydrographic Office	.20
24	General Examination of Indian Ocean, with Directions for the Navigation of Torres Straits, etc. By Capt. Charles Philippe De Kerhallet, I. F. N. Translated by Capt. R. H. Wyman, U. S. N. 8vo. 1870. Hydrographic Office	2.00
29	Physical Geography of the Red Sea, with Sailing Directions. By Capt. W. Krop, I. A. N. Translated by E. R. Knorr. 8vo. 1872. Hydrographic Office	.25
	LIGHT LISTS.	
30	List of Lights (No. 1) of North and South America (excepting the United States), including the West Indies and Pacific Islands. Compiled by Boynton Leach. 4to. 1893. Hydrographic Office	.25
74	List of Lights (No. 5) of the North, Baltic, and White Seas, including the Coasts of Denmark, Prussia, Russia, Sweden, and Norway. Compiled by Boynton Leach. 8vo. Hydrographic Office	.25
33	List of Lights (No. 4) of the West Coast of Europe, from Gibraltar to the White Sea. 4to. 1894. Hydrographic Office. (*In preparation.*)	.25
32	List of Lights (No. 3) of the West Coast of Africa and the Mediterranean Sea, including the West and North Coasts of Africa, the Mediterranean, the Adriatic, the Black Seas, and the Sea of Azof. Compiled by Boynton Leach. 4to. 1893. Hydrographic Office	.25
31	List of Lights (No. 2) of South and East Coasts of Africa, and the East Indies, including the East India Islands, China, Japan, Australia, Tasmania, and New Zealand. Compiled by Boynton Leach. 8vo. 1892. Hydrographic Office	.25

No.	Title of book.	Price.
	NAVIGATION BOOKS.	
72	List of Geographical Positions. By Lieut. Commander F. M. Green, U. S. N. 4to. 1883. Bureau of Navigation	$0.75
9	The New American Practical Navigator. By Nathaniel Bowditch, LL. D. 8vo. Edition of 1893. Bureau of Navigation	2.25
13	Bowditch's Useful Tables. 8vo. Edition of 1893. Bureau of Navigation	1.25
17	Projection Tables. 8vo. 1869. Bureau of Navigation	1.50
71	Azimuth Tables for parallels of latitude between 61° N. and 61° S. By Lieut. W. H. H. Southerland, U. S. N. 4to. Edition of 1893. Hydrographic Office	4.25
106	Azimuth Tables for parallels of latitude between 40° N. and 50° N. 4to. 1894. Hydrographic Office	
63	Arctic Azimuth Tables for parallels of latitude between 70° and 88°. Prepared by Lieuts. Seaton Schroeder and Richard Wainwright, U. S. N. 12mo. 1881. Hydrographic Office	.80
57	Tables for Finding the distance of an Object by two Bearings. (Pamphlet.) 1874. Hydrographic Office	.20
49	The Route of Mail Steamers between the English Channel and New York. 1873. (Pamphlet.) Hydrographic Office	.30
90	The Development of Great Circle Sailing. By G. W. Littlehales. 8vo. 1889. Hydrographic Office	1.00
91	Table of Meridianal Parts for the Terrestrial Spheroid, Compression $\frac{1}{293.465}$. By G. W. Littlehales and J. S. Siebert. 8vo. 1889. Hydrographic Office	1.20
	COMPASSES AND DEVIATION.	
19	Ship's Compasses, including the subject of Binnacles and Swinging Ship. By Commodore T. A. Jenkins, U. S. N. (Pamphlet.) 1869. Bureau of Navigation	.40
	METEOROLOGICAL.	
4	The Way to Avoid the Center of our Violent Gales. 8vo. 1868. Bureau of Navigation	.10
77	Practical Hints in regard to West India Hurricanes. By Lieut. G. L. Dyer, U. S. N. 1887. (Pamphlet.) Hydrographic Office	.10
—	Nautical Monograph No. 5. The Great Storm off the Atlantic Coast of the United States, March 11-14, 1888. By Everett Hayden, U. S. N. 1888. Hydrographic Office	(*)
	SURVEYS.	
36	Memoranda for Running Surveys. By E. R. Knorr. (Pamphlet.) 1872. Bureau of Navigation	.20
14	General Instructions for Hydrographic Surveyors. (Pamphlet.) 1868. Bureau of Navigation	.20
101	The Methods and Results of the Survey of the West Coast of Lower California by the Officers of the U. S. S. Ranger during the season of 1889 and 1890. By Lieut. O. W. Lowry, U. S. N., and G. W. Littlehales. 8vo. 1892. Hydrographic Office	(*)
	SIGNALS.	
87	International Signal Code. Revised and corrected to 1894, including the semaphore and storm-signal service of the maritime countries, the life-saving service and time-ball system of the United States. 8vo. 1894. Bureau of Navigation. (In press.)	3.00
	MISCELLANEOUS PUBLICATIONS.	
65	Report on the Telegraphic Determination of Differences of Longitude in the West Indies and Central America. By Lieut. Commander F. M. Green, U. S. N. 4to. 1877. Bureau of Navigation	(*)

*Not for sale.

No.	Title of book.	Price.
	MISCELLANEOUS PUBLICATIONS—Continued.	
65*a*	Report on the Telegraphic Determination of Differences of Longitude on the East Coast of South America. By Lieut. Commander F. M. Green, U. S. N. 4to. 1880. Bureau of Navigation	(*)
65*b*	Report on the Telegraphic Determination of Longitude in the East Indies, China, and Japan. By Lieut. Commander F. M. Green, U. S. N. 4to. 1881-82. Bureau of Navigation	(*)
76	Report of Telegraphic Determinations of Longitudes in Mexico, Central America, and West Coast of South America. By Lieut. Commander C. H. Davis, Lieuts. J. A. Norris and Charles Laird, U. S. N. 4to. 1885. Bureau of Navigation	(*)
97	Report on the Telegraphic Determination of Longitudes in Mexico, Central America, the West Indies, and on the North Coast of South America, with the Latitudes of the Several Stations. By Lieuts. J. A. Norris and Charles Laird, U. S. N. To which is appended a Report on Magnetic Observations in Mexico and the West Indies. By Lieut. Charles Laird, and Ensigns J. H. L. Holcombe and L. M. Garrett, U. S. N. 4to. 1891. Bureau of Navigation	(*)
94	Report of the International Meteorologic Congress at Paris, 1889. By Lieut. Aaron Ward, U. S. N. (Pamphlet.) 1890	$0.20
95	The average form of Isolated Submarine Peaks and the interval which should obtain between deep-sea soundings taken to disclose the character of the bottom of the ocean. By G. W. Littlehales. 8vo. 1890. Hydrographic Office	.70
98	Report on Uniform System for Spelling Foreign Geographic Names. By Lieut. C. M. McCarteney, U. S. N., Boynton Leach, and Gustave Herrle. (Pamphlet.) 1891. Hydrographic Office	(*)
103	Submarine Cables; Instruments and Implements Employed in Cable Surveys; Theory of Cable Laying; Specifications and Costs; Submarine Cable Systems of the World. Prepared by G. W. Littlehales. 8vo. 1892. Hydrographic Office	1.00
107	Wrecks and Derelicts in the North Atlantic Ocean. 1887 to 1893, inclusive. 4to. 1894. Hydrographic Office	

---

*Not for sale.

AGENTS FOR THE SALE OF HYDROGRAPHIC OFFICE CHARTS, SAILING DIRECTIONS, ETC.

AGENTS IN THE UNITED STATES.

C. H. Cummings, Eastport, Me.
N. C. Wallace, Millbridge, Me.
Albert W. Bee, Bar Harbor, Me.
Spear, May, & Stover, No 408 Main street, Rockland, Me.
George Bliss, Waldoboro, Me.
William O. McCobb, Booth Bay Harbor, Me.
Charles A. Harriman, Bath, Me.
William Senter & Co., No. 51 Exchange street, Portland, Me.
P. A. Chisolm, No. 161 Main street, Gloucester, Mass.
Henry P. Ives, No. 232 Essex street, Salem, Mass.
Charles C. Hutchinson, No. 152 State street, Boston, Mass.
Samuel Thaxter & Son, No. 125 State street, Boston, Mass.
E. St. Croix Oliver, Vineyard Haven, Mass.
C. R. Sherman & Son, New Bedford, Mass.
George A. Stockwell, 12, Board of Trade Building, Providence, R. I.
J. M. K. Southwick, No. 185 Thames street, Newport, R. I.
C. C. Ball, Block Island.
D. B. Hempstead, No. 25 Bank street, New London, Conn.
Sergt. P. Daniels, New London, Conn.
James H. Stivers, No. 72 Water street, Stonington, Conn.
R. D. Stevens, customhouse, Hartford, Conn.
H. H. Babcock, customhouse, New Haven, Conn.
A. H. Kellam, New Haven, Conn.
T. S. & J. D. Negus, No. 140 Water street, New York City.
R. Merrill's Sons, No. 110 Wall street, New York City.
Michael Rupp & Co., No. 39 South street, New York City.
D. Eggert's Sons, No. 74 Wall street, New York City.
John Bliss & Co., No. 128 Front street, New York City.
Thomas Manning, No. 53 Beaver street, New York City.
E. Steiger & Co., No. 25 Park Place, New York City.
Thomas S. Faulkner, emigrant clearing house, Ellis Island, N. Y.
Frank M. Porch, customhouse, Bridgeton, N. J.
Riggs & Bro., No. 221 Walnut street, Philadelphia, Pa.
F. J. Sloane & Co., corner Pratt street and Speer's wharf, Baltimore, Md.
M. B. O'Neal, No. 502 East Pratt street, Baltimore, Md.
C. C. Lapsley, No. 53 South Gay street, Baltimore, Md.
J. J. Chapman, No. 915 Pennsylvania avenue, Washington, D. C.
W. H. Lowdermilk & Co., No. 1424 F street, NW., Washington, D. C.
J. H. Hickcox, No. 906 M street, NW., Washington, D. C.

R. Bell's Sons, South Fairfax street, Alexandria, Va.
C. F. Greenwood & Bro., No. 158 Main street, Norfolk, Va.
Vickery & Co., No. 124 Main street, Norfolk, Va.
Godfrey Hart, No. 24 South Front street, Wilmington, N. C.
W. N. Harriss, with Geo. Harriss & Co., North Water street, Wilmington, N. C.
W. A. Wilson, No. 115 East Bay street, Charleston, S. C.
J. P. Johnson, customhouse, Savannah, Ga.
W. S. Cherry & Co., No. 89 Bay street, Savannah, Ga.
J. W. Howell, customhouse, Fernandina, Fla.
Horace Drew, Jacksonville, Fla.
Robert Ransom, Titusville, Fla.
Brelsford Bros., Palm Beach, Fla.
H. B. Bayer, Key West, Fla.
Alfred Brost, office of lighthouse inspector, Key West, Fla.
Babbitt & Co., Franklin street, Tampa, Fla.
C. D. Webster, 83 and 85 Tarpon avenue, Tarpon Springs, Fla.
J. E. Grady, Apalachicola, Fla.
Henry Horsler & Co., 706 and 708 South Palafox street, Pensacola, Fla.
McKezie, Oerting & Co., 599 South Palafox street, Pensacola, Fla.
J. R. Edwards, Mobile, Ala.
Pollard & Bond, Mobile, Ala.
Jas. I. Friar, Pascagoula, Miss.
L. Frigerio, No. 161 Canal street, New Orleans, La.
Woodward, Wight & Co., Nos. 38, 40, 42 Canal street, New Orleans, La.
Frigerio & Schully, 85 Royal street, New Orleans, La.
Chas. F. Trube, Galveston, Tex.
Rand, McNally & Co., 164 and 168 Adams street, Chicago, Ill.
Dodge & Burbeck, corner Fifth and D streets, San Diego, Cal.
W. L. Banning, San Pedro, Cal.
Stoll & Thayer Co., 139 South Spring street, Los Angeles, Cal.
H. A. C. McPhail, Santa Barbara, Cal.
S. S. Arnheim, No. 8 Stuart street, San Francisco, Cal.
Dillon & Co., No. 310 California street, San Francisco, Cal.
Louis Weule, No. 418 Battery street, San Francisco, Cal.
H. Lawrenson, No. 8 Stuart street, San Francisco, Cal.
Griffen & Reed, Astoria, Oregon.
James E. Matthews, Eureka, Humboldt County, Cal.
J. K. Gill & Co., Nos. 28 and 30 First street, Portland, Oreg.
James Jones, Port Townsend, Wash.
Waterman & Katz, Port Townsend, Wash.
Vaughen & Morrill, Tacoma, Wash.
Boeringer & Co., Tacoma, Wash.
Lowman & Hanford, Seattle, Wash.
W. H. Pumphrey, Seattle, Wash.
Edward De Groff, Sitka, Alaska.

AGENTS IN FOREIGN PORTS.

T. N. Hibben & Co., 67 Government street, Victoria, British Columbia.
Garrett Byrne, St. Johns, Newfoundland.
Alex. Bain, Port Hawkesbury, Nova Scotia.
Robert H. Cogswell, Halifax, Nova Scotia.
J. & A. McMillan, St. John, New Brunswick.
Hearn & Harrison, 1640 Notre Dame street, Montreal, Canada.
Hunter & Grant, Hamilton, Ontario.
T. Darling & Co., Nassau, Bahama.

E. J. D. Astwood, Turks Island.
Edwin W. Wilson, 41 and 43 Obispo street, Havana, Cuba.
J. P. Thorsen, St. Thomas, West Indies.
James Gall, Kingston, Jamaica.
John A. Donnatien, Port Spain, Trinidad, West Indies.
Para, Brazil, at the consulate.
Manuel Bottini, Montevideo, Uruguay.
Arthur B. Dalias, Pernambuco, Brazil.
St. Helena Island, at the consulate.
John Newton, 2 Calle de la Constitucion, Callao, Peru.
F. A. Markert, Guaymas, Mexico.
Philip, Son & Nephew, 41 to 51 South Castle street, Liverpool, England.
Alexander Dobbie & Son, 18 Clyde Place, Glasgow, Scotland.
V. & M. Lepetit, 15 Rue de Paris, Havre, France.
G. W. Lohmann, Schliefmuhle 21, Bremen, Germany.
Eckardt & Messtorff, Hamburg, Germany.
Charles Gaupp & Co., Hongkong, China.
Russell L. Webb, Manila, Philippine Islands.

○